Off Board BOM

VB Dynamic DC Load

The enclosure:

TEKO AUS 33.5 Polystyrene 198x178x108mm

https://www.reichelt.com/nl/nl/shop/product/polystyreen_behuizing_198x178x108mm-21208#open-modal-image-big-slider

The AUS 33.5 is the bottom one from this stack.

The OLED display:

A Waveshare 128x128 1.5 inch color display

https://www.amazon.com/waveshare-1-5inch-RGB-OLED-Module/dp/B07DBXMFSN/ref=sr_1_1_sspa?crid=2ESRZ9ZDK8XZV&dib=eyJ2IjoiMSJ9.CtqPbCjEZfvSpF68GI5hxhvkFgvi3jkDHxRzV-lAeTspivc3Mrbp2BeEGA0WkSey2zo9wX_ZOaff0CMGs3kkS64Y8oqEOuZXVJG7g8Bur77PsTSCh5eiqmS2Q37uG6GpNTG_wYY2hr9IOwKtUmo6RDg4uA8AQUNjwUJmrzcuh_b7P5aJa3LjLMfqFRt83rnKhCz7Okmdnmznl EbGljUHda_SBS4mqvrzCqrMdqY6ZXs.kM4HffjJ4vmoj5brd0guuLJ9At0tBhnuYsMZO6Og1Ac&dib_tag=se&keywords=1.5inch+RGB+OLED+Display+Module+128x128+Pixels+color&qid=1712049477&sprefix=1.5inch+rgb+oled+display+module+128x128+pixels+color%2Caps%2C158&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1

Details: https://www.waveshare.com/wiki/1.5inch_RGB_OLED_Module

Two Fans:

The two fans are Noctua NF-A9x14 PWM.

https://www.amazon.com/Noctua-NF-A9x14-Premium-Quiet-92x14mm/dp/B009NQM7V2/ref=sr_1_1?crid=RIMLK7YHUYG&dib=eyJ2IjoiMSJ9.nyBCEPUapDaneASOxl51-GoFAI2gneNvo_L_7y7PvptNYUsWO8vls8muktP-fMtsixiYzGWWNjB_pfIOkhMrEkcbExYJ2GUsNunyWm2PBPcVopcJo9UYp2vv9I_WEgdxSwcWoaulTG52Eb787wj8LxpJL5M6SYRROFRAST1aSes111bdt36O9wIye3COD3cEAJairt7QAdKNhEV9U87LBZ1DnZs7Lem8byVV0Njec3s.fpH4J03QezsT5n-wXBJ0zsEq5JCF2PJ7nk5z6RBp2FA&dib_tag=se&keywords=noctua+nf-a9x14+pwm&qid=1726838223&sprefix=Noctua+NF-A9x14%2Caps%2C166&sr=8-1

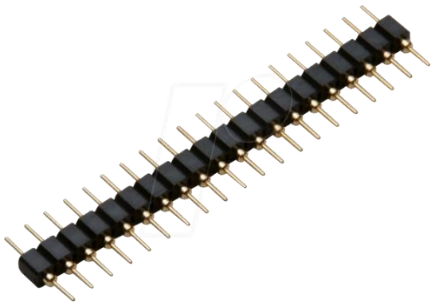
ESP32 WROOM 4Mb Devkit V1 Board

Make sure you get the unassembled version, without the connectors installed. The ones listed below are for a pack of three but seem to have the diode and the reboot capacitors installed. See the Blog for more details.

https://www.amazon.com/dp/B09QW6Y7KY/ref=sspa_dk_detail_6?pd_rd_i=B09QW6Y7KY&pd_rd_w=uks1g&content-id=amzn1.sym.386c274b-4bfe-4421-9052-a1a56db557ab&pf_rd_p=386c274b-4bfe-4421-9052-a1a56db557ab&pf_rd_r=2BP3YYWY5FBW5442JZAJ&pd_rd_wg=QCono&pd_rd_r=59a45996-bb27-4ab3-8a51-801088fcc171&s=pc&sp_csd=d2lkZ2V0TmFtZT1zcF9kZXRhaWxfdGhlbWF0aWM&th=1

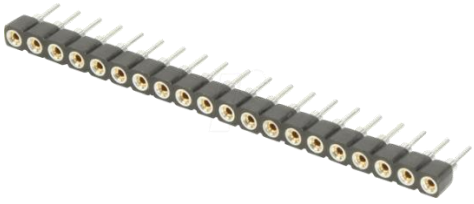
Male instrumentation header pins for the ESP32:

https://www.reichelt.com/nl/nl/shop/product/nauwkeurige_male_connector_20-polig_2_54_mm-235666?PROVID=2809&gad_source=1&gclid=Cj0KCQjwurS3BhCGARIsADdUH500XkxoHRjMcLN8ngMTOhFaHuKWn4UAld509o8MFIObZYtctC2s_MsaAoaTEALw_wcB



Female instrumentation header pins for the ESP32:

https://www.reichelt.com/nl/nl/shop/product/precisiecontactdoosstrook_2_54_mm_20-polig-119950#closemodal



DC Power Jack Panel Mount:

https://nl.aliexpress.com/item/32826020679.html?spm=a2g0o.detail.pcDetailTopMoreOtherSeller.8.13e20tXG0tXGm5&gps-id=pcDetailTopMoreOtherSeller&scm=1007.40000.327270.0&scm_id=1007.40000.327270.0&scm-url=1007.40000.327270.0&pvid=aba505bf-ca4f-4815-abe0-5ec3232bc843&_t=gps-id:pcDetailTopMoreOtherSeller,scm-url:1007.40000.327270.0,pvid:aba505bf-ca4f-4815-abe0-5ec3232bc843,tpp_buckets:668%232846%238111%231996&pdp_npi=4%40dis%21EUR%211.38%210.93%21%21%211.46%210.98%21%40211b6002171682078642012 49ee288%2164980637808%21rec%21NL%21%21AB&utparam-url=scene%3ApcDetailTopMoreOtherSeller%7Cquery_from%3A

For the SPST on/off power switch and the DPDT on-on switch for the sense input:

As an example: e-switch p/n 100SP1T1B1M1QEH - SWITCH TOGGLE SPDT 5A 120V

Alternatively, you can also use one with different solder lugs 100SP1T1B1M3QEH

Digikey p/n EG2350-ND
LCSC p/n 100SP1T1B1M1QEH

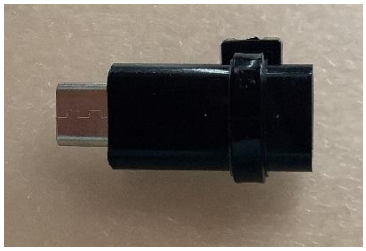
Two Double 4mm Binding posts (for the main and sense inputs):

https://nl.aliexpress.com/item/1005006993637978.html?src=google&src=google&albch=shopping&acnt=708-803-3821&slnk=&plac=&mtctp=&albbt=Google_7_shopping&gclsrc=aw.ds&albagn=888888&isSmbAutoCall=false&needSmbHouyi=false&src=google&albch=shopping&acnt=708-803-3821&slnk=&plac=&mtctp=&albbt=Google_7_shopping&gclsrc=aw.ds&albagn=888888&ds_e_adid=&ds_e_matchtype=&ds_e_device=c&ds_e_network=x&ds_e_product_group_id=&ds_e_product_id=nl1005006993637978&ds_e_product_merchant_id=107685434&ds_e_product_country=NL&ds_e_product_language=nl&ds_e_product_channel=online&ds_e_product_store_id=&ds_url_v=2&albcp=19996252768&albag=&isSmbAutoCall=false&needSmbHouyi=false&gad_source=1&gclid=Cj0KCQjw3tCyBhDBARIsAEY0XNkM-C99DVmCVJD7q6hpzAQ7BVQk5Jpec9cncQ3TRbGqM05Pp4N1SW4aAtAMEALw_wcB&aff_fcid=49db050fc73e43d88329da19ac360644-1716820282761-08537-UneMJZVf&aff_fsk=UneMJZVf&aff_platform=aaf&sk=UneMJZVf&aff_trace_key=49db050fc73e43d88329da19ac360644-1716820282761-08537-UneMJZVf&terminal_id=37b0b5df1e714a659472cd0fb08fa9b5&afSmartRedirect=y

Four Rubber feet for the enclosure:

https://nl.aliexpress.com/item/1005006140637202.html?spm=a2g0o.productlist.main.11.5f006777weRaLJ&algo_pvid=b57c2085-1b92-44cf-9603-8b2d2531de0d&algo_exp_id=b57c2085-1b92-44cf-9603-8b2d2531de0d-5&pdp_npi=4%40dis%21EUR%215.76%210.93%21%21%2144.24%217.14%21%40211b6004171682090069533353eddc9%211200000359415300008%21sea%21NL%210%21AB&curPageLogUid=qmO3vVLQShF4&utparam-url=scene%3Asearch%7Cquery_from%3A

USB-micro to USB-C adapter



To bring the ESP32 micro-USB connector to the front panel. Shown here with a tie-wrap installed.

TO-220 isolators for the LM45 and the L-shape rails for the heatsink/fan mount and silicon pads for the LM35

https://nl.aliexpress.com/item/1005003600636535.html?spm=a2g0o.productlist.main.5.2d6f745bfBK0XB&algo_pvid=e590fb4f-7700-4df9-9a37-41cd1e558271&algo_exp_id=e590fb4f-7700-4df9-9a37-41cd1e558271-2&pdp_npi=4%40dis%21EUR%211.76%210.93%21%21%211.86%210.98%21%40211b600417168210999308410eddc9%212120000026448146183%21sea%21NL%210%21AB&curPageLogUid=SUDuTFwmZYuM&utparam-url=scene%3Asearch%7Cquery_from%3A

Bottom fan mount:

M3x30mm Screws, rings, self-locking nuts, nylon rings.

OLED display mount:

8xM2 nuts, 4xM2 flat washers

Heatsink mount:

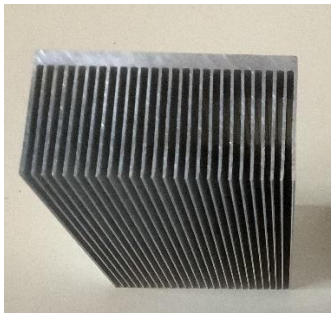
Aluminium L-strip 15x15x1mm 2x 90mm long

Your local DIY store.

Main Heatsink:

100x60x36mm

https://nl.aliexpress.com/item/1005005795216874.html?spm=a2g0o.detail.pcDetailTopMoreOtherSeller.7.2c04stAXstAXYL&gps-id=pcDetailTopMoreOtherSeller&scm=1007.40000.327270.0&scm_id=1007.40000.327270.0&scm-url=1007.40000.327270.0&pvid=e745e66a-a627-4546-9679-3ce570f7cdcc&_t=gps-id:pcDetailTopMoreOtherSeller,scm-url:1007.40000.327270.0,pvid:e745e66a-a627-4546-9679-3ce570f7cdcc,tpp_buckets:668%232846%238110%231995&pdp_npi=4%40dis%21EUR%2115.30%210.91%21%21%21117.68%216.96%21%402103872a17268410663474898ef22d%2112000034413592877%21rec%21NL%21%21ABX&utparam-url=scene%3ApcDetailTopMoreOtherSeller%7Cquery_from%3A



Two Standoffs for the PCB:

Four 30mm M3 standoffs, screwed together to get the 60 mm height. I'm using M3 screws, rings and nuts to fasten them, and also adjust the height.

https://nl.aliexpress.com/item/1005006201670859.html?spm=a2g0o.productlist.main.43.4ca97687eaHHDP&algo_pvid=c1665eca-7a20-451e-94b5-16e1ba2e0f6b&algo_exp_id=c1665eca-7a20-451e-94b5-16e1ba2e0f6b-21&pdp_npi=4%40dis%21EUR%213.10%213.10%21%21%213.29%213.29%21%40211b801b171682135554862 44e0284%21120000036249519037%21sea%21NL%210%21AB&curPageLogUid=8EM8qmvjzLlG&utparam-url=scene%3Asearch%7Cquery_from%3A

Wire crimp connectors for the heavy duty wires for the main input (10A minimum!)

This is a box with an assortment:

https://nl.aliexpress.com/item/1005005738838654.html?spm=a2g0o.productlist.main.1.490c7e76Ukgn7C&algo_pvid=8adb5801-7605-48ce-b92f-a7cbc3ca99d5&algo_exp_id=8adb5801-7605-48ce-b92f-a7cbc3ca99d5-0&pdp_npi=4%40dis%21EUR%2123.73%210.93%21%21%21182.38%217.14%21%40211b619a17168216939968441e1157%21120000034168670880%21sea%21NL%210%21AB&curPageLogUid=QiBeLuplCDFR&utparam-url=scene%3Asearch%7Cquery_from%3A

Rotary Encoder

This is a run-of-the-mill inexpensive rotary encoder with a push button function that can be purchased from many places like Amazon, Aliexpress and the likes. You typically buy them in packs of five, sometimes even with a knob, which are even less expensive than a single one real ALPS one that can cost you much more.

https://www.amazon.com/Taiss-Detents-Points-Encoder-Diameter/dp/B07F24TRYG/ref=sxin_16_pa_sp_search_thematic_sspa?content-id=amzn1.sym.76d54fcc-2362-404d-ab9b-b0653e2b2239%3Aamzn1.sym.76d54fcc-2362-404d-ab9b-b0653e2b2239&crid=32Q2IV39ISFO&cv_ct_cx=rotary+encoder&dib=eyJ2IjoiMSJ9.y5gXuZk0wI-_INogZdOQ3Ln7KjeyX9y9fvOeQxetOkMJGP9rdr5e3fHNtEJjEHxq-

WmaZQu76mDJsxoBq_PJlw.41UuJ8bK0AFsITN6XAw7U6sHsxXHwWUS2M9Xm3qxV_Q&dib_tag=se&keywords=rotary+encoder&pd_rd_i=B07F24TRYG&pd_rd_r=e39047d9-f702-42a2-843c-4dea181409a7&pd_rd_w=LzL1R&pd_rd_wg=6IOnq&pf_rd_p=76d54fcc-2362-404d-ab9b-b0653e2b2239&pf_rd_r=NK1BHSNWNBFSW3HASHHG&qid=1729766934&sbo=RZvfv%2F%2FHxDF%2BO5021pAnSA%3D%3D&sprefix=rotary+encode%2Caps%2C189&sr=1-3-6024b2a3-78e4-4fed-8fed-e1613be3bcce-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9zZWFyY2hfdGhlbWF0aWM&psc=1

An example for the rotary encoder knob: (eat your hart out...)

https://www.aliexpress.com/item/1005006832967267.html?spm=a2g0o.productlist.main.35.7b7d1b1cOOB9Nk&algo_pvid=71978a98-8bff-4885-89eb-4c9ded82aa0f&algo_exp_id=71978a98-8bff-4885-89eb-4c9ded82aa0f-17&pdp_npi=4%40dis%21EUR%211.62%211.62%21%21%211.72%211.72%21%40211b61531716822 1322161616e35bc%211200000384482831 45%21sea%21NL%210%21AB&curPageLogUid=jStiSbQpthMK&utparam-url=scene%3Asearch%7Cquery_from%3A

Solder lugs:

For 4mm binding posts

Two TO-220 Heatsinks for the NFET's

V5630-T from Assmann WSW Components,
Digikey partnumber AE10898-ND

Two BNC connectors

They are for the Transient Input and the Current Monitor output.

Adam Tech partnumber RF1-106-D-00-50-HDW-ND

Digikey p/n 2057-RF1-106-D-00-50-HDW-ND

LCSC p/n RF1-106-D-00-50-HDW

10nF capacitor

This capacitor is mounted directly on the BNC connector itself for the Current Monitor.

The LCSC partnumber is Y5V103M2KV16CC0204, but you can use any 10nF 50V or higher Voltage THT capacitor.

Wall-Wart 12V 500mA

One word of caution about the wall-wart. After many months of working with the unit, and very frequently turning it on and off, the main relay stopped working. It turned out that the 12V coil winding was open. While searching for a possible cause, I noticed that the 12V from the wall-wart I

was using was slightly above 15V. This was not a switching supply, but one with a transformer. The data sheet says that 130% or 15.6V for the relay should be within specifications, but still. Because the instrument only draws about 300mA maximum, it can be that the wall-wart output voltage is higher than 15V. I'm now using one that outputs 12.2V, even with no load.