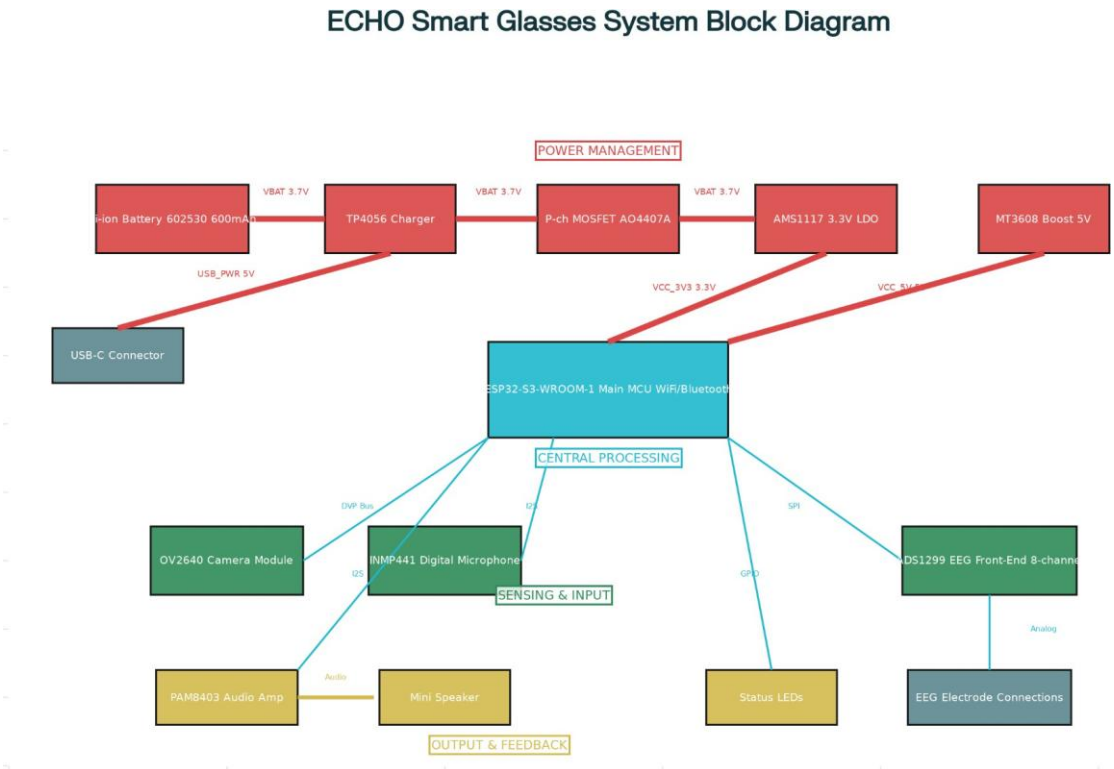
ECHO Smart-Glasses Hardware Documentation

ECHO is a wearable assistive platform designed to help people living with Alzheimer's disease recognise familiar faces and receive context-aware audio cues in real time. The device combines edge AI vision, speech, and electroencephalography (EEG) sensing in a lightweight form factor comparable to commercially available smart glasses. The following report provides a complete, component-level description of the hardware, justifying each design choice and mapping every power and data path needed to reprodu...

System-Level Architecture

ECHO is divided into four interacting domains: power management, central processing, sensing, and feedback. All subsystems converge on a single ESP32-S3 edge processor that performs AI inference and orchestrates peripherals over SPI, I2C, I2S and an eight-bit DVP camera bus. The holistic arrangement is shown in the block diagram below.



1. Design Requirements

1.1 Clinical and User Constraints

Hands-free recognition of up to 20 known faces within 500 ms latency.

Whisper-quiet audio prompts (< 60 dB at ear) to avoid startling users.

Continuous operation > 2 h from a 600 mAh Li-ion pouch while streaming video, audio, and EEG data.

EEG front-end noise < 1 uVpp to preserve cortical-rhythm fidelity for cognitive-state tagging.

1.2 Engineering Constraints

Envelope: 140 mm x 34 mm temple PCB, 4-layer, 1 mm FR-4.

All components must be available in low-height (<= 2 mm) QFN, TQFP or CSP packages to fit inside glasses temples.

Firmware upgrades and data off-load over Wi-Fi/BLE; USB-C limited to charging/programming.

2. Power Management Subsystem

2.1 Battery and Charging

A 602530 600 mAh Li-ion pouch cell feeds the system through a TP4056-42 linear charger, chosen for its single-cell profile and minimal external parts. The charger's VCC pin receives 5 V from the USB-C connector, and its BAT node both charges the cell and powers the drain of a P-channel AO4407A MOSFET that implements load-sharing.

2.2 Regulation

AMS1117-3.3 V LDO provides a quiet rail for digital logic, camera analog blocks and EEG ADC references; dropout remains acceptable down to 3.5 V battery.

MT3608 boost converter steps VBAT to 5 V for the PAM8403 Class-D amplifier, maintaining 85% efficiency under 3 W stereo load.

Ferrite beads isolate the ADS1299 analog supply from digital transients, meeting > -110 dB common-mode rejection targets.

3. Central Processing and Connectivity

The ESP32-S3-WROOM-1 module integrates dual-core LX7 MCU, 16 MB flash, 8 MB PSRAM, 2.4 GHz Wi-Fi and BLE 5.0 LE for OTA updates and companion-app telemetry. Key pin assignments:

Bus ESP32-S3 GPIO Peripheral Notes

DVP camera 32-24 + 13 OV2640 8-bit parallel + XCLK

I2S audio 40/39/42 INMP441 mic 24-bit PCM @ 48 kHz

SPI 16/15/17/18 ADS1299 EEG 8-channel, 24-bit @ 8 kSps

I2C 4 / 5 Camera control, IMU (option) 400 kHz

DAC 25 Audio out to PAM8403 Mono sum

The S3's USB-OTG interface doubles as a UART/JTAG programming port, reducing BoM by eliminating a discrete bridge IC.

4. Sensing Subsystems

4.1 Vision - OV2640 Camera

Delivers 1600 x 1200 (UXGA) at 15 fps with integrated JPEG compression, allowing direct streaming into PSRAM buffers for face-embedding extraction. Rolling-shutter artefacts are mitigated via short exposure (<= 8 ms) and IMU-assisted stabilisation (future work).

4.2 Audio - INMP441 MEMS Microphone

Bottom-port digital microphone captures 24-bit audio at up to 48 kHz over I2S. Omnidirectional polar pattern simplifies enclosure design and maintains < 1% THD.

4.3 EEG - ADS1299 Front-End

TI's ADS1299 integrates eight simultaneous delta-sigma ADC channels with 1 uVpp input-referred noise and programmable gains up to x24. Validated against lab-grade amplifiers for EEG monitoring.

5. Output and Feedback

5.1 Audio Playback

PAM8403 Class-D amplifier drives a 16-ohm micro-speaker delivering 3 W peak at 5 V. Shutdown and mute pins connect to ESP32 GPIOs.

5.2 Status Indicators

Low-current red/green LEDs display charging state via TP4056. RGB LED signals Wi-Fi pairing and update status.

6. Data Flow and Timing

- Image Capture: OV2640 raises VSYNC -> ESP32 ISR timestamps frame (~15 fps)
- Pre-Processing: Face crop resized, normalised in PSRAM; MobileFaceNet inference < 120 ms
- Audio Cue: ESP32 streams PCM to speaker (~28 kB/s)
- EEG Tagging: ADS1299 samples at 250 Sps; events tagged and labelled for later analysis

7. Safety, EMC and Regulatory Considerations

EMC compliance via star-grounding and shielding. BLE conforms to ETSI EN 300 328. Wi-Fi output < 14 dBm for SAR compliance.

8. Documentation Best Practices

Includes README, KiCad schematics, BoM, CI firmware setup, and versioned Gerbers and STL files. Designed for reproducibility.

9. Future Extensions

- Eye-tracking via IR camera
- On-device federated learning
- Bone-conduction audio
- Battery upgrade to 1000 mAh graphene-polymer cell

Conclusion

ECHO integrates an ESP32-S3, ADS1299 EEG front-end, OV2640 camera, and PAM8403 audio in a compact design. Its open documentation enables researchers to replicate and extend the platform.

Appendix: Pin/Connection Reference Table

```
(export (version "E")
  (design
    (source "C:\\Users\\ashut\\OneDrive\\Documents\\ECHO\\ECHO.kicad_sch")
    (date "2025-07-26T02:05:18+0530")
    (tool "Eeschema 9.0.3")
    (sheet (number "1") (name "/") (tstamps "/")
      (title_block
        (title)
        (company)
        (rev)
        (date)
        (source "ECHO.kicad_sch")
        (comment (number "1") (value ""))
        (comment (number "2") (value ""))
        (comment (number "3") (value ""))
        (comment (number "4") (value ""))
        (comment (number "5") (value ""))
        (comment (number "6") (value ""))
        (comment (number "7") (value ""))
        (comment (number "8") (value ""))
        (comment (number "9") (value "")))))
  (components
    (comp (ref "BT1")
      (value "Li-ion 602530 600mAh")
      (datasheet "~")
      (description "Single-cell battery")
      (fields
        (field (name "Footprint"))
```

(field (name "Datasheet") "~")
(field (name "Description") "Single-cell battery"))
(libsource (lib "Device") (part "Battery_Cell") (description "Single-cell battery"))
(property (name "Sheetname") (value "Root"))
(property (name "Sheetfile") (value "ECHO.kicad_sch"))
(property (name "ki_keywords") (value "battery cell"))
(sheetpath (names "/") (tstamps "/"))
(tstamps "915583a0-f0d1-4381-807a-e7c366cfeae9"))
(comp (ref "CAM1")
(value "OV2640")
(footprint "OV2640 (1):OV2640")
(fields
(field (name "MF") "Omnivision Technologies")
(field (name "Description_1") "OV2640 Camera Sensor M5Stack Platform Evaluation Expansion Board")
(field (name "Package") "None")
(field (name "Price") "None")
(field (name "SnapEDA_Link") "https://www.snapeda.com/parts/OV2640/Omnivision+Technologies/view-part/?ref=snap")
(field (name "MP") "OV2640")
(field (name "Availability") "Not in stock")
(field (name "Check_prices") "https://www.snapeda.com/parts/OV2640/Omnivision+Technologies/view-part/?ref=eda")
(field (name "Footprint") "OV2640 (1):OV2640")
(field (name "Datasheet"))
(field (name "Description")))
(libsource (lib "OV2640") (part "OV2640") (description ""))
(property (name "MF") (value "Omnivision Technologies"))
(property (name "Description_1") (value "OV2640 Camera Sensor M5Stack Platform Evaluation Expansion Board"))
(property (name "Package") (value "None"))
(property (name "Price") (value "None"))
(property (name "SnapEDA_Link") (value "https://www.snapeda.com/parts/OV2640/Omnivision+Technologies/view-part/?ref=snap"))

```
    (property (name "MP") (value "OV2640"))
    (property (name "Availability") (value "Not in stock"))
    (property (name "Check_prices") (value
"https://www.snapeda.com/parts/OV2640/Omnivision+Technologies/view-part/?ref=eda"))
    (property (name "Sheetname") (value "Root"))
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "5aa6cbd4-e0d5-4216-a4e2-2b86e4608073"))
  (comp (ref "D1")
    (value "LED")
    (datasheet "~")
    (description "Diode")
    (fields
      (field (name "Sim.Device") "D")
      (field (name "Sim.Pins") "1=K 2=A")
      (field (name "Footprint"))
      (field (name "Datasheet") "~")
      (field (name "Description") "Diode"))
    (libsource (lib "Device") (part "D") (description "Diode"))
    (property (name "Sim.Device") (value "D"))
    (property (name "Sim.Pins") (value "1=K 2=A"))
    (property (name "Sheetname") (value "Root"))
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (property (name "ki_keywords") (value "diode"))
    (property (name "ki_fp_filters") (value "TO-???* *_Diode_* *SingleDiode* D_*"))
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "c70ceca5-73c3-4260-a912-537854463e7f"))
  (comp (ref "MK2")
    (value "INMP441")
    (footprint "INMP441:MIC_INMP441")
    (fields
      (field (name "MF") "TDK InvenSense")
      (field (name "MAXIMUM_PACKAGE_HEIGHT") "1.05 mm")
```

```
      (field (name "Package") "None")
      (field (name "Price") "None")
      (field (name "Check_prices") "https://www.snapeda.com/parts/INMP441/TDK/view-part/?ref=eda")
      (field (name "STANDARD") "Manufacturer Recommendations")
      (field (name "PARTREV") "1.1")
      (field (name "SnapEDA_Link") "https://www.snapeda.com/parts/INMP441/TDK/view-part/?ref=snap")
      (field (name "MP") "INMP441")
      (field (name "Description_1") "EVAL BOARD MEMS MIC INMP441")
      (field (name "Availability") "In Stock")
      (field (name "MANUFACTURER") "TDK InvenSense")
      (field (name "Footprint") "INMP441:MIC_INMP441")
      (field (name "Datasheet"))
      (field (name "Description")))
    (libsource (lib "INMP441") (part "INMP441") (description ""))
    (property (name "MF") (value "TDK InvenSense"))
    (property (name "MAXIMUM_PACKAGE_HEIGHT") (value "1.05 mm"))
    (property (name "Package") (value "None"))
    (property (name "Price") (value "None"))
    (property (name "Check_prices") (value "https://www.snapeda.com/parts/INMP441/TDK/view-part/?ref=eda"))
    (property (name "STANDARD") (value "Manufacturer Recommendations"))
    (property (name "PARTREV") (value "1.1"))
    (property (name "SnapEDA_Link") (value "https://www.snapeda.com/parts/INMP441/TDK/view-part/?ref=snap"))
    (property (name "MP") (value "INMP441"))
    (property (name "Description_1") (value "EVAL BOARD MEMS MIC INMP441"))
    (property (name "Availability") (value "In Stock"))
    (property (name "MANUFACTURER") (value "TDK InvenSense"))
    (property (name "Sheetname") (value "Root"))
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "f8946db1-47a0-405c-ad46-a63f9b4ae2c2"))
  (comp (ref "P1")
```

```
    (value "USB_C_Plug_USB2.0")
    (datasheet "https://www.usb.org/sites/default/files/documents/usb_type-c.zip")
    (description "USB 2.0-only Type-C Plug connector")
    (fields
      (field (name "Footprint"))
      (field (name "Datasheet") "https://www.usb.org/sites/default/files/documents/usb_type-c.zip")
      (field (name "Description") "USB 2.0-only Type-C Plug connector"))
        (libsource (lib "Connector") (part "USB_C_Plug_USB2.0") (description "USB 2.0-only Type-C Plug connector"))
    (property (name "Sheetname") (value "Root"))
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (property (name "ki_keywords") (value "usb universal serial bus type-C USB2.0"))
    (property (name "ki_fp_filters") (value "USB*C*Plug*"))
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "568ec25b-d55d-43c6-b94d-ffa775610a4a"))
  (comp (ref "Q1")
    (value "AO4407A")
    (footprint "AO4407A:SOIC127P600X175-8N")
    (fields
      (field (name "MF") "Alpha &")
      (field (name "MAXIMUM_PACKAGE_HEIGHT") "1.75 mm")
      (field (name "Package") "SOIC-8 Alpha &amp;amp; Omega Semiconductor")
      (field (name "Price") "None")
      (field (name "Check_prices") "https://www.snapeda.com/parts/AO4407A/Alpha/view-part/?ref=eda")
      (field (name "STANDARD") "IPC 7351B")
      (field (name "PARTREV") "I")
      (field (name "SnapEDA_Link") "https://www.snapeda.com/parts/AO4407A/Alpha/view-part/?ref=snap")
      (field (name "MP") "AO4407A")
      (field (name "Description_1") "P-Channel 30 V 12A (Ta) 3.1W (Ta) Surface Mount 8-SOIC")
      (field (name "Availability") "In Stock")
      (field (name "MANUFACTURER") "Alpha & Omega Semiconductor")
      (field (name "Footprint") "AO4407A:SOIC127P600X175-8N")
      (field (name "Datasheet"))
```

```
      (field (name "Description")))
    (libsource (lib "AO4407A") (part "AO4407A") (description ""))
    (property (name "MF") (value "Alpha &"))
    (property (name "MAXIMUM_PACKAGE_HEIGHT") (value "1.75 mm"))
    (property (name "Package") (value "SOIC-8 Alpha &amp;amp; Omega Semiconductor"))
    (property (name "Price") (value "None"))
                                        (property (name "Check_prices") (value
"https://www.snapeda.com/parts/AO4407A/Alpha/view-part/?ref=eda"))
    (property (name "STANDARD") (value "IPC 7351B"))
    (property (name "PARTREV") (value "I"))
                                        (property (name "SnapEDA_Link") (value
"https://www.snapeda.com/parts/AO4407A/Alpha/view-part/?ref=snap"))
    (property (name "MP") (value "AO4407A"))
    (property (name "Description_1") (value "P-Channel 30 V 12A (Ta) 3.1W (Ta) Surface Mount 8-SOIC"))
    (property (name "Availability") (value "In Stock"))
    (property (name "MANUFACTURER") (value "Alpha & Omega Semiconductor"))
    (property (name "Sheetname") (value "Root"))
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "40c68f40-f599-4cc4-a2db-9c2d1ee91886"))
  (comp (ref "R1")
    (value "1.2k")
    (datasheet "~")
    (description "Resistor")
    (fields
      (field (name "Footprint"))
      (field (name "Datasheet") "~")
      (field (name "Description") "Resistor"))
    (libsource (lib "Device") (part "R") (description "Resistor"))
    (property (name "Sheetname") (value "Root"))
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (property (name "ki_keywords") (value "R res resistor"))
    (property (name "ki_fp_filters") (value "R_*"))
```

```
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "b7ddb898-d569-4b88-8ebe-590935a36c73"))
  (comp (ref "R2")
    (value "R")
    (datasheet "~")
    (description "Resistor")
    (fields
      (field (name "Footprint"))
      (field (name "Datasheet") "~")
      (field (name "Description") "Resistor"))
    (libsource (lib "Device") (part "R") (description "Resistor"))
    (property (name "Sheetname") (value "Root"))
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (property (name "ki_keywords") (value "R res resistor"))
    (property (name "ki_fp_filters") (value "R_*"))
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "c9dae186-dfe2-4d74-b71c-cc5a0cfd2a3d"))
  (comp (ref "U1")
    (value "TP4056-41-ESOP")
    (footprint "Package_SO:SOIC-8-1EP_3.9x4.9mm_P1.27mm_EP2.41x3.3mm_ThermalVias")
                                                                    (datasheet
"https://www.lcsc.com/datasheet/lcsc_datasheet_2410121619_TOPPOWER-Nanjing-Extension-Microelectro
nics-TP4056-42-ESOP8_C16581.pdf")
    (description "1A Standalone Linear Li-ion/LiPo single-cell battery charger, 4.2V ±1% charge voltage, VCC
= 4.0..8.0V, SOIC-8 (SOP-8)")
    (fields
                                                    (field (name "Footprint")
"Package_SO:SOIC-8-1EP_3.9x4.9mm_P1.27mm_EP2.41x3.3mm_ThermalVias")
                                                    (field (name "Datasheet")
"https://www.lcsc.com/datasheet/lcsc_datasheet_2410121619_TOPPOWER-Nanjing-Extension-Microelectro
nics-TP4056-42-ESOP8_C16581.pdf")
      (field (name "Description") "1A Standalone Linear Li-ion/LiPo single-cell battery charger, 4.2V ±1%
charge voltage, VCC = 4.0..8.0V, SOIC-8 (SOP-8)"))
```

(libsource (lib "Battery_Management") (part "TP4056-42-ESOP8") (description "1A Standalone Linear Li-ion/LiPo single-cell battery charger, 4.2V ±1% charge voltage, VCC = 4.0..8.0V, SOIC-8 (SOP-8)"))
(property (name "Sheetname") (value "Root"))
(property (name "Sheetfile") (value "ECHO.kicad_sch"))
(property (name "ki_keywords") (value "lithium-ion lithium-polymer Li-Poly"))
(property (name "ki_fp_filters") (value "*SO*3.9x4.*P1.27mm*EP2.4*x3.3*mm*"))
(sheetpath (names "/") (tstamps "/"))
(tstamps "b16d6b0e-2c56-49fb-9018-63213fbc3a1f"))
(comp (ref "U2")
(value "AMS1117-3.3")
(footprint "Package_TO_SOT_SMD:SOT-223-3_TabPin2")
(datasheet "http://www.advanced-monolithic.com/pdf/ds1117.pdf")
(description "1A Low Dropout regulator, positive, 3.3V fixed output, SOT-223")
(fields
(field (name "Footprint") "Package_TO_SOT_SMD:SOT-223-3_TabPin2")
(field (name "Datasheet") "http://www.advanced-monolithic.com/pdf/ds1117.pdf")
(field (name "Description") "1A Low Dropout regulator, positive, 3.3V fixed output, SOT-223"))
(libsource (lib "Regulator_Linear") (part "AMS1117-3.3") (description "1A Low Dropout regulator, positive, 3.3V fixed output, SOT-223"))
(property (name "Sheetname") (value "Root"))
(property (name "Sheetfile") (value "ECHO.kicad_sch"))
(property (name "ki_keywords") (value "linear regulator ldo fixed positive"))
(property (name "ki_fp_filters") (value "SOT?223*TabPin2*"))
(sheetpath (names "/") (tstamps "/"))
(tstamps "a03974c2-6baa-4659-befd-240814d0f5c4"))
(comp (ref "U3")
(value "MT3608")
(footprint "Package_TO_SOT_SMD:SOT-23-6")
(datasheet "https://www.olimex.com/Products/Breadboarding/BB-PWR-3608/resources/MT3608.pdf")
(description "High Efficiency 1.2MHz 2A Step Up Converter, 2-24V Vin, 28V Vout, 4A current limit, 1.2MHz, SOT23-6")
(fields
(field (name "Footprint") "Package_TO_SOT_SMD:SOT-23-6")

(field (name "Datasheet") "https://www.olimex.com/Products/Breadboarding/BB-PWR-3608/resources/MT3608.pdf")
(field (name "Description") "High Efficiency 1.2MHz 2A Step Up Converter, 2-24V Vin, 28V Vout, 4A current limit, 1.2MHz, SOT23-6"))
(libsource (lib "Regulator_Switching") (part "MT3608") (description "High Efficiency 1.2MHz 2A Step Up Converter, 2-24V Vin, 28V Vout, 4A current limit, 1.2MHz, SOT23-6"))
(property (name "Sheetname") (value "Root"))
(property (name "Sheetfile") (value "ECHO.kicad_sch"))
(property (name "ki_keywords") (value "Step-Up Boost DC-DC Regulator Adjustable"))
(property (name "ki_fp_filters") (value "SOT*23*"))
(sheetpath (names "/") (tstamps "/"))
(tstamps "b0bbd7c9-7b50-4e71-a78f-5d0550080bf2"))
(comp (ref "U4")
(value "ESP32-S3-WROOM-1")
(footprint "RF_Module:ESP32-S3-WROOM-1")
(datasheet "https://www.espressif.com/sites/default/files/documentation/esp32-s3-wroom-1_wroom-1u_datasheet_en.pdf")
(description "RF Module, ESP32-S3 SoC, Wi-Fi 802.11b/g/n, Bluetooth, BLE, 32-bit, 3.3V, onboard antenna, SMD")
(fields
(field (name "Footprint") "RF_Module:ESP32-S3-WROOM-1")
(field (name "Datasheet") "https://www.espressif.com/sites/default/files/documentation/esp32-s3-wroom-1_wroom-1u_datasheet_en.pdf")
(field (name "Description") "RF Module, ESP32-S3 SoC, Wi-Fi 802.11b/g/n, Bluetooth, BLE, 32-bit, 3.3V, onboard antenna, SMD"))
(libsource (lib "RF_Module") (part "ESP32-S3-WROOM-1") (description "RF Module, ESP32-S3 SoC, Wi-Fi 802.11b/g/n, Bluetooth, BLE, 32-bit, 3.3V, onboard antenna, SMD"))
(property (name "Sheetname") (value "Root"))
(property (name "Sheetfile") (value "ECHO.kicad_sch"))
(property (name "ki_keywords") (value "RF Radio BT ESP ESP32-S3 Espressif onboard PCB antenna"))
(property (name "ki_fp_filters") (value "ESP32?S3?WROOM?1*"))

(sheetpath (names "/") (tstamps "/"))
(tstamps "ece56320-98d6-4459-809c-284e182caec7"))
(comp (ref "U5")
(value "ADS1299IPAG")
(footprint "ADS1299IPAG:QFP50P1200X1200X120-64N")
(fields
(field (name "MF") "Texas Instruments")
(field (name "Description_1") "Low-Noise, 8-Channel, 24-Bit Analog-to-Digital Converter for Biopotential Measurements")
(field (name "Package") "TQFP-64 Texas Instruments")
(field (name "Price") "None")
(field (name "SnapEDA_Link") "https://www.snapeda.com/parts/ADS1299IPAG/Texas+Instruments/view-part/?ref=snap")
(field (name "MP") "ADS1299IPAG")
(field (name "Availability") "In Stock")
(field (name "Check_prices") "https://www.snapeda.com/parts/ADS1299IPAG/Texas+Instruments/view-part/?ref=eda")
(field (name "Footprint") "ADS1299IPAG:QFP50P1200X1200X120-64N")
(field (name "Datasheet"))
(field (name "Description")))
(libsource (lib "ADS1299IPAG") (part "ADS1299IPAG") (description ""))
(property (name "MF") (value "Texas Instruments"))
(property (name "Description_1") (value "Low-Noise, 8-Channel, 24-Bit Analog-to-Digital Converter for Biopotential Measurements"))
(property (name "Package") (value "TQFP-64 Texas Instruments"))
(property (name "Price") (value "None"))
(property (name "SnapEDA_Link") (value "https://www.snapeda.com/parts/ADS1299IPAG/Texas+Instruments/view-part/?ref=snap"))
(property (name "MP") (value "ADS1299IPAG"))
(property (name "Availability") (value "In Stock"))
(property (name "Check_prices") (value "https://www.snapeda.com/parts/ADS1299IPAG/Texas+Instruments/view-part/?ref=eda"))
(property (name "Sheetname") (value "Root"))

```
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "6ba32d7d-fd78-48bd-9ab7-01216ab98d69"))
  (comp (ref "U6")
    (value "PAM8403D")
    (footprint "Package_SO:SOP-16_3.9x9.9mm_P1.27mm")
    (datasheet "https://www.diodes.com/assets/Datasheets/products_inactive_data/PAM8403.pdf")
    (description "3W Filterless Class-D Stereo Audio Amplifier, SOP-16")
    (fields
      (field (name "Footprint") "Package_SO:SOP-16_3.9x9.9mm_P1.27mm")
                                                    (field (name "Datasheet")
"https://www.diodes.com/assets/Datasheets/products_inactive_data/PAM8403.pdf")
      (field (name "Description") "3W Filterless Class-D Stereo Audio Amplifier, SOP-16"))
      (libsource (lib "Amplifier_Audio") (part "PAM8403D") (description "3W Filterless Class-D Stereo Audio
Amplifier, SOP-16"))
    (property (name "Sheetname") (value "Root"))
    (property (name "Sheetfile") (value "ECHO.kicad_sch"))
    (property (name "ki_keywords") (value "audio amplifier class d"))
    (property (name "ki_fp_filters") (value "SOP*3.9x9.9mm*P1.27mm*"))
    (sheetpath (names "/") (tstamps "/"))
    (tstamps "0265f4aa-115b-4c9b-affe-fba074d34fb8")))
  (libparts
    (libpart (lib "ADS1299IPAG") (part "ADS1299IPAG")
      (fields
        (field (name "Reference") "U")
        (field (name "Value") "ADS1299IPAG")
        (field (name "Footprint") "ADS1299IPAG:QFP50P1200X1200X120-64N")
        (field (name "Datasheet"))
        (field (name "Description"))
        (field (name "MF") "Texas Instruments")
        (field (name "Description_1") "Low-Noise, 8-Channel, 24-Bit Analog-to-Digital Converter for Biopotential
Measurements")
        (field (name "Package") "TQFP-64 Texas Instruments")
```

(field (name "Price") "None")
(field (name "SnapEDA_Link") "https://www.snapeda.com/parts/ADS1299IPAG/Texas+Instruments/view-part/?ref=snap")
(field (name "MP") "ADS1299IPAG")
(field (name "Availability") "In Stock")
(field (name "Check_prices") "https://www.snapeda.com/parts/ADS1299IPAG/Texas+Instruments/view-part/?ref=eda"))
(pins
(pin (num "1") (name "IN8N") (type "input"))
(pin (num "2") (name "IN8P") (type "input"))
(pin (num "3") (name "IN7N") (type "input"))
(pin (num "4") (name "IN7P") (type "input"))
(pin (num "5") (name "IN6N") (type "input"))
(pin (num "6") (name "IN6P") (type "input"))
(pin (num "7") (name "IN5N") (type "input"))
(pin (num "8") (name "IN5P") (type "input"))
(pin (num "9") (name "IN4N") (type "input"))
(pin (num "10") (name "IN4P") (type "input"))
(pin (num "11") (name "IN3N") (type "input"))
(pin (num "12") (name "IN3P") (type "input"))
(pin (num "13") (name "IN2N") (type "input"))
(pin (num "14") (name "IN2P") (type "input"))
(pin (num "15") (name "IN1N") (type "input"))
(pin (num "16") (name "IN1P") (type "input"))
(pin (num "17") (name "SRB1") (type "bidirectional"))
(pin (num "18") (name "SRB2") (type "bidirectional"))
(pin (num "19") (name "AVDD@1") (type "power_in"))
(pin (num "20") (name "AVSS@1") (type "power_in"))
(pin (num "21") (name "AVDD@1") (type "power_in"))
(pin (num "22") (name "AVDD@1") (type "power_in"))
(pin (num "23") (name "AVSS@1") (type "power_in"))
(pin (num "24") (name "VREFP") (type "input"))
(pin (num "25") (name "VREFN") (type "input"))

(pin (num "26") (name "VCAP4") (type "bidirectional"))
(pin (num "28") (name "VCAP1") (type "output"))
(pin (num "30") (name "VCAP2") (type "output"))
(pin (num "31") (name "RESV1") (type "input"))
(pin (num "32") (name "AVSS@1") (type "power_in"))
(pin (num "33") (name "DGND") (type "power_in"))
(pin (num "34") (name "DIN") (type "input"))
(pin (num "35") (name "~{PWDN}") (type "input"))
(pin (num "36") (name "~{RESET}") (type "input"))
(pin (num "37") (name "CLK") (type "input"))
(pin (num "38") (name "START") (type "input"))
(pin (num "39") (name "~{CS}") (type "input"))
(pin (num "40") (name "SCLK") (type "input"))
(pin (num "41") (name "DAISY_IN") (type "input"))
(pin (num "42") (name "GPIO1") (type "bidirectional"))
(pin (num "43") (name "DOUT") (type "output"))
(pin (num "44") (name "GPIO2") (type "bidirectional"))
(pin (num "45") (name "GPIO3") (type "bidirectional"))
(pin (num "46") (name "GPIO4") (type "bidirectional"))
(pin (num "47") (name "~{DRDY}") (type "output"))
(pin (num "48") (name "DVDD") (type "power_in"))
(pin (num "49") (name "DGND") (type "power_in"))
(pin (num "50") (name "DVDD") (type "power_in"))
(pin (num "51") (name "DGND") (type "power_in"))
(pin (num "52") (name "CLKSEL") (type "input"))
(pin (num "53") (name "AVSS1") (type "power_in"))
(pin (num "54") (name "AVDD1") (type "power_in"))
(pin (num "55") (name "VCAP3") (type "bidirectional"))
(pin (num "56") (name "AVDD@1") (type "power_in"))
(pin (num "57") (name "AVSS@1") (type "power_in"))
(pin (num "58") (name "AVSS@2") (type "power_in"))
(pin (num "59") (name "AVDD@2") (type "power_in"))
(pin (num "60") (name "BIASREF") (type "input"))

```
    (pin (num "61") (name "BIASINV") (type "input"))
    (pin (num "62") (name "BIASIN") (type "input"))
    (pin (num "63") (name "BIASOUT") (type "output"))
    (pin (num "64") (name "RESERVED") (type "output"))))
  (libpart (lib "AO4407A") (part "AO4407A")
    (fields
      (field (name "Reference") "Q")
      (field (name "Value") "AO4407A")
      (field (name "Footprint") "AO4407A:SOIC127P600X175-8N")
      (field (name "Datasheet"))
      (field (name "Description"))
      (field (name "MF") "Alpha &")
      (field (name "MAXIMUM_PACKAGE_HEIGHT") "1.75 mm")
      (field (name "Package") "SOIC-8 Alpha &amp;amp; Omega Semiconductor")
      (field (name "Price") "None")
      (field (name "Check_prices") "https://www.snapeda.com/parts/AO4407A/Alpha/view-part/?ref=eda")
      (field (name "STANDARD") "IPC 7351B")
      (field (name "PARTREV") "I")
      (field (name "SnapEDA_Link") "https://www.snapeda.com/parts/AO4407A/Alpha/view-part/?ref=snap")
      (field (name "MP") "AO4407A")
      (field (name "Description_1") "P-Channel 30 V 12A (Ta) 3.1W (Ta) Surface Mount 8-SOIC")
      (field (name "Availability") "In Stock")
      (field (name "MANUFACTURER") "Alpha & Omega Semiconductor"))
    (pins
      (pin (num "1") (name "") (type "passive"))
      (pin (num "2") (name "") (type "passive"))
      (pin (num "3") (name "") (type "passive"))
      (pin (num "4") (name "") (type "passive"))
      (pin (num "5") (name "") (type "passive"))
      (pin (num "6") (name "") (type "passive"))
      (pin (num "7") (name "") (type "passive"))
      (pin (num "8") (name "") (type "passive"))))
  (libpart (lib "Amplifier_Audio") (part "PAM8403D")
```

```
    (description "3W Filterless Class-D Stereo Audio Amplifier, SOP-16")
    (docs "https://www.diodes.com/assets/Datasheets/products_inactive_data/PAM8403.pdf")
    (footprints
      (fp "SOP*3.9x9.9mm*P1.27mm*"))
    (fields
      (field (name "Reference") "U")
      (field (name "Value") "PAM8403D")
      (field (name "Footprint") "Package_SO:SOP-16_3.9x9.9mm_P1.27mm")
                                                    (field (name "Datasheet")
"https://www.diodes.com/assets/Datasheets/products_inactive_data/PAM8403.pdf")
      (field (name "Description") "3W Filterless Class-D Stereo Audio Amplifier, SOP-16"))
    (pins
      (pin (num "1") (name "LOUT+") (type "output"))
      (pin (num "2") (name "PGND") (type "power_in"))
      (pin (num "3") (name "LOUT-") (type "output"))
      (pin (num "4") (name "PVDD") (type "power_in"))
      (pin (num "5") (name "~{MUTE}") (type "input"))
      (pin (num "6") (name "VDD") (type "power_in"))
      (pin (num "7") (name "INL") (type "input"))
      (pin (num "8") (name "VREF") (type "input"))
      (pin (num "9") (name "NC") (type "no_connect"))
      (pin (num "10") (name "INR") (type "input"))
      (pin (num "11") (name "GND") (type "power_in"))
      (pin (num "12") (name "~{SHDN}") (type "input"))
      (pin (num "13") (name "PVDD") (type "passive"))
      (pin (num "14") (name "ROUT-") (type "output"))
      (pin (num "15") (name "PGND") (type "passive"))
      (pin (num "16") (name "ROUT+") (type "output"))))
  (libpart (lib "Battery_Management") (part "TP4056-42-ESOP8")
    (description "1A Standalone Linear Li-ion/LiPo single-cell battery charger, 4.2V ±1% charge voltage, VCC
= 4.0..8.0V, SOIC-8 (SOP-8)")
                                                    (docs
"https://www.lcsc.com/datasheet/lcsc_datasheet_2410121619_TOPPOWER-Nanjing-Extension-Microelectro
```

nics-TP4056-42-ESOP8_C16581.pdf")
(footprints
(fp "*SO*3.9x4.*P1.27mm*EP2.4*x3.3*mm*"))
(fields
(field (name "Reference") "U")
(field (name "Value") "TP4056-42-ESOP8")
(field (name "Footprint") "Package_SO:SOIC-8-1EP_3.9x4.9mm_P1.27mm_EP2.41x3.3mm_ThermalVias")
(field (name "Datasheet") "https://www.lcsc.com/datasheet/lcsc_datasheet_2410121619_TOPPOWER-Nanjing-Extension-Microelectronics-TP4056-42-ESOP8_C16581.pdf")
(field (name "Description") "1A Standalone Linear Li-ion/LiPo single-cell battery charger, 4.2V ±1% charge voltage, VCC = 4.0..8.0V, SOIC-8 (SOP-8)"))
(pins
(pin (num "1") (name "TEMP") (type "input"))
(pin (num "2") (name "PROG") (type "passive"))
(pin (num "3") (name "GND") (type "power_in"))
(pin (num "4") (name "V_{CC}") (type "power_in"))
(pin (num "5") (name "BAT") (type "power_out"))
(pin (num "6") (name "~{STDBY}") (type "open_collector"))
(pin (num "7") (name "~{CHRG}") (type "open_collector"))
(pin (num "8") (name "CE") (type "input"))
(pin (num "9") (name "EPAD") (type "passive"))))
(libpart (lib "Connector") (part "USB_C_Plug_USB2.0")
(description "USB 2.0-only Type-C Plug connector")
(docs "https://www.usb.org/sites/default/files/documents/usb_type-c.zip")
(footprints
(fp "USB*C*Plug*"))
(fields
(field (name "Reference") "P")
(field (name "Value") "USB_C_Plug_USB2.0")
(field (name "Footprint"))
(field (name "Datasheet") "https://www.usb.org/sites/default/files/documents/usb_type-c.zip")

```
    (field (name "Description") "USB 2.0-only Type-C Plug connector"))
  (pins
    (pin (num "A1") (name "GND") (type "passive"))
    (pin (num "A4") (name "VBUS") (type "passive"))
    (pin (num "A5") (name "CC") (type "bidirectional"))
    (pin (num "A6") (name "D+") (type "bidirectional"))
    (pin (num "A7") (name "D-") (type "bidirectional"))
    (pin (num "A9") (name "VBUS") (type "passive"))
    (pin (num "A12") (name "GND") (type "passive"))
    (pin (num "B1") (name "GND") (type "passive"))
    (pin (num "B4") (name "VBUS") (type "passive"))
    (pin (num "B5") (name "VCONN") (type "bidirectional"))
    (pin (num "B9") (name "VBUS") (type "passive"))
    (pin (num "B12") (name "GND") (type "passive"))
    (pin (num "S1") (name "SHIELD") (type "passive"))))
(libpart (lib "Device") (part "Battery_Cell")
  (description "Single-cell battery")
  (docs "~")
  (fields
    (field (name "Reference") "BT")
    (field (name "Value") "Battery_Cell")
    (field (name "Footprint"))
    (field (name "Datasheet") "~")
    (field (name "Description") "Single-cell battery"))
  (pins
    (pin (num "1") (name "+") (type "passive"))
    (pin (num "2") (name "-") (type "passive"))))
(libpart (lib "Device") (part "D")
  (description "Diode")
  (docs "~")
  (footprints
    (fp "TO-???*")
    (fp "*_Diode_*")
```

```
    (fp "*SingleDiode*")
    (fp "D_*"))
  (fields
    (field (name "Reference") "D")
    (field (name "Value") "D")
    (field (name "Footprint"))
    (field (name "Datasheet") "~")
    (field (name "Description") "Diode")
    (field (name "Sim.Device") "D")
    (field (name "Sim.Pins") "1=K 2=A"))
  (pins
    (pin (num "1") (name "K") (type "passive"))
    (pin (num "2") (name "A") (type "passive"))))
(libpart (lib "Device") (part "R")
  (description "Resistor")
  (docs "~")
  (footprints
  (fp "R_*"))
  (fields
    (field (name "Reference") "R")
    (field (name "Value") "R")
    (field (name "Footprint"))
    (field (name "Datasheet") "~")
    (field (name "Description") "Resistor"))
  (pins
    (pin (num "1") (name "") (type "passive"))
    (pin (num "2") (name "") (type "passive"))))
(libpart (lib "INMP441") (part "INMP441")
(fields
    (field (name "Reference") "MK")
    (field (name "Value") "INMP441")
    (field (name "Footprint") "INMP441:MIC_INMP441")
    (field (name "Datasheet"))
```

```
    (field (name "Description"))
    (field (name "MF") "TDK InvenSense")
    (field (name "MAXIMUM_PACKAGE_HEIGHT") "1.05 mm")
    (field (name "Package") "None")
    (field (name "Price") "None")
    (field (name "Check_prices") "https://www.snapeda.com/parts/INMP441/TDK/view-part/?ref=eda")
    (field (name "STANDARD") "Manufacturer Recommendations")
    (field (name "PARTREV") "1.1")
    (field (name "SnapEDA_Link") "https://www.snapeda.com/parts/INMP441/TDK/view-part/?ref=snap")
    (field (name "MP") "INMP441")
    (field (name "Description_1") "EVAL BOARD MEMS MIC INMP441")
    (field (name "Availability") "In Stock")
    (field (name "MANUFACTURER") "TDK InvenSense"))
   (pins
    (pin (num "1") (name "SCK") (type "input"))
    (pin (num "2") (name "SD") (type "bidirectional"))
    (pin (num "3") (name "WS") (type "input"))
    (pin (num "4") (name "L/R") (type "input"))
    (pin (num "5_1") (name "GND") (type "power_in"))
    (pin (num "5_2") (name "GND") (type "power_in"))
    (pin (num "6") (name "GND") (type "power_in"))
    (pin (num "7") (name "VDD") (type "power_in"))
    (pin (num "8") (name "CHIPEN") (type "input"))
    (pin (num "9") (name "GND") (type "power_in"))))
  (libpart (lib "OV2640") (part "OV2640")
   (fields
    (field (name "Reference") "CAM")
    (field (name "Value") "OV2640")
    (field (name "Footprint") "OV2640:OV2640")
    (field (name "Datasheet"))
    (field (name "Description"))
    (field (name "MF") "Omnivision Technologies")
    (field (name "Description_1") "OV2640 Camera Sensor M5Stack Platform Evaluation Expansion Board")
```

```
    (field (name "Package") "None")
    (field (name "Price") "None")
                                                    (field (name "SnapEDA_Link")
"https://www.snapeda.com/parts/OV2640/Omnivision+Technologies/view-part/?ref=snap")
    (field (name "MP") "OV2640")
    (field (name "Availability") "Not in stock")
                                                    (field (name "Check_prices")
"https://www.snapeda.com/parts/OV2640/Omnivision+Technologies/view-part/?ref=eda"))
  (pins
    (pin (num "1") (name "STROBE") (type "bidirectional"))
    (pin (num "2") (name "AGND") (type "bidirectional"))
    (pin (num "3") (name "SIO_D") (type "bidirectional"))
    (pin (num "4") (name "AVDD") (type "bidirectional"))
    (pin (num "5") (name "SIO_C") (type "bidirectional"))
    (pin (num "6") (name "RESET") (type "bidirectional"))
    (pin (num "7") (name "VSYNC") (type "bidirectional"))
    (pin (num "8") (name "PWDN") (type "bidirectional"))
    (pin (num "9") (name "HREF") (type "bidirectional"))
    (pin (num "10") (name "DVDD") (type "bidirectional"))
    (pin (num "11") (name "DOVDD") (type "bidirectional"))
    (pin (num "12") (name "DATA9") (type "bidirectional"))
    (pin (num "13") (name "XCLK") (type "bidirectional"))
    (pin (num "14") (name "DATA8") (type "bidirectional"))
    (pin (num "15") (name "DGND") (type "bidirectional"))
    (pin (num "16") (name "DATA7") (type "bidirectional"))
    (pin (num "17") (name "PCLK") (type "bidirectional"))
    (pin (num "18") (name "DATA6") (type "bidirectional"))
    (pin (num "19") (name "DATA2") (type "bidirectional"))
    (pin (num "20") (name "DATA5") (type "bidirectional"))
    (pin (num "21") (name "DATA3") (type "bidirectional"))
    (pin (num "22") (name "DATA4") (type "bidirectional"))
    (pin (num "23") (name "DATA1") (type "bidirectional"))
    (pin (num "24") (name "DATA0") (type "bidirectional"))
```

```
    (pin (num "MT1") (name "DGND") (type "bidirectional"))
    (pin (num "MT2") (name "DGND") (type "bidirectional"))))
  (libpart (lib "RF_Module") (part "ESP32-S3-WROOM-1")
    (description "RF Module, ESP32-S3 SoC, Wi-Fi 802.11b/g/n, Bluetooth, BLE, 32-bit, 3.3V, onboard antenna, SMD")
    (docs "https://www.espressif.com/sites/default/files/documentation/esp32-s3-wroom-1_wroom-1u_datasheet_en.pdf")
    (footprints
      (fp "ESP32?S3?WROOM?1*"))
    (fields
      (field (name "Reference") "U")
      (field (name "Value") "ESP32-S3-WROOM-1")
      (field (name "Footprint") "RF_Module:ESP32-S3-WROOM-1")
      (field (name "Datasheet") "https://www.espressif.com/sites/default/files/documentation/esp32-s3-wroom-1_wroom-1u_datasheet_en.pdf")
      (field (name "Description") "RF Module, ESP32-S3 SoC, Wi-Fi 802.11b/g/n, Bluetooth, BLE, 32-bit, 3.3V, onboard antenna, SMD"))
    (pins
      (pin (num "1") (name "GND") (type "power_in"))
      (pin (num "2") (name "3V3") (type "power_in"))
      (pin (num "3") (name "EN") (type "input"))
      (pin (num "4") (name "IO4") (type "bidirectional"))
      (pin (num "5") (name "IO5") (type "bidirectional"))
      (pin (num "6") (name "IO6") (type "bidirectional"))
      (pin (num "7") (name "IO7") (type "bidirectional"))
      (pin (num "8") (name "IO15") (type "bidirectional"))
      (pin (num "9") (name "IO16") (type "bidirectional"))
      (pin (num "10") (name "IO17") (type "bidirectional"))
      (pin (num "11") (name "IO18") (type "bidirectional"))
      (pin (num "12") (name "IO8") (type "bidirectional"))
      (pin (num "13") (name "USB_D-") (type "bidirectional"))
```

```
    (pin (num "14") (name "USB_D+") (type "bidirectional"))
    (pin (num "15") (name "IO3") (type "bidirectional"))
    (pin (num "16") (name "IO46") (type "bidirectional"))
    (pin (num "17") (name "IO9") (type "bidirectional"))
    (pin (num "18") (name "IO10") (type "bidirectional"))
    (pin (num "19") (name "IO11") (type "bidirectional"))
    (pin (num "20") (name "IO12") (type "bidirectional"))
    (pin (num "21") (name "IO13") (type "bidirectional"))
    (pin (num "22") (name "IO14") (type "bidirectional"))
    (pin (num "23") (name "IO21") (type "bidirectional"))
    (pin (num "24") (name "IO47") (type "bidirectional"))
    (pin (num "25") (name "IO48") (type "bidirectional"))
    (pin (num "26") (name "IO45") (type "bidirectional"))
    (pin (num "27") (name "IO0") (type "bidirectional"))
    (pin (num "28") (name "IO35") (type "bidirectional"))
    (pin (num "29") (name "IO36") (type "bidirectional"))
    (pin (num "30") (name "IO37") (type "bidirectional"))
    (pin (num "31") (name "IO38") (type "bidirectional"))
    (pin (num "32") (name "IO39") (type "bidirectional"))
    (pin (num "33") (name "IO40") (type "bidirectional"))
    (pin (num "34") (name "IO41") (type "bidirectional"))
    (pin (num "35") (name "IO42") (type "bidirectional"))
    (pin (num "36") (name "RXD0") (type "bidirectional"))
    (pin (num "37") (name "TXD0") (type "bidirectional"))
    (pin (num "38") (name "IO2") (type "bidirectional"))
    (pin (num "39") (name "IO1") (type "bidirectional"))
    (pin (num "40") (name "GND") (type "passive"))
    (pin (num "41") (name "GND") (type "passive"))))
  (libpart (lib "Regulator_Linear") (part "AMS1117-3.3")
    (description "1A Low Dropout regulator, positive, 3.3V fixed output, SOT-223")
    (docs "http://www.advanced-monolithic.com/pdf/ds1117.pdf")
    (footprints
      (fp "SOT?223*TabPin2*"))
```

```
    (fields
      (field (name "Reference") "U")
      (field (name "Value") "AMS1117-3.3")
      (field (name "Footprint") "Package_TO_SOT_SMD:SOT-223-3_TabPin2")
      (field (name "Datasheet") "http://www.advanced-monolithic.com/pdf/ds1117.pdf")
      (field (name "Description") "1A Low Dropout regulator, positive, 3.3V fixed output, SOT-223"))
    (pins
      (pin (num "1") (name "GND") (type "power_in"))
      (pin (num "2") (name "VO") (type "power_out"))
      (pin (num "3") (name "VI") (type "power_in"))))
  (libpart (lib "Regulator_Switching") (part "MT3608")
      (description "High Efficiency 1.2MHz 2A Step Up Converter, 2-24V Vin, 28V Vout, 4A current limit, 1.2MHz, SOT23-6")
    (docs "https://www.olimex.com/Products/Breadboarding/BB-PWR-3608/resources/MT3608.pdf")
    (footprints
      (fp "SOT*23*"))
    (fields
      (field (name "Reference") "U")
      (field (name "Value") "MT3608")
      (field (name "Footprint") "Package_TO_SOT_SMD:SOT-23-6")
      (field (name "Datasheet") "https://www.olimex.com/Products/Breadboarding/BB-PWR-3608/resources/MT3608.pdf")
      (field (name "Description") "High Efficiency 1.2MHz 2A Step Up Converter, 2-24V Vin, 28V Vout, 4A current limit, 1.2MHz, SOT23-6"))
    (pins
      (pin (num "1") (name "SW") (type "passive"))
      (pin (num "2") (name "GND") (type "power_in"))
      (pin (num "3") (name "FB") (type "input"))
      (pin (num "4") (name "EN") (type "input"))
      (pin (num "5") (name "IN") (type "power_in"))
      (pin (num "6") (name "NC") (type "no_connect")))))
  (libraries
    (library (logical "ADS1299IPAG")
```

```
    (uri "C:\\Users\\ashut\\Downloads\\ADS1299IPAG\\ADS1299IPAG.kicad_sym"))
  (library (logical "AO4407A")
    (uri "C:\\Users\\ashut\\Downloads\\AO4407A\\AO4407A.kicad_sym"))
  (library (logical "Amplifier_Audio")
    (uri "C:\\Program Files\\KiCad\\9.0\\share\\kicad\\symbols\\/Amplifier_Audio.kicad_sym"))
  (library (logical "Battery_Management")
    (uri "C:\\Program Files\\KiCad\\9.0\\share\\kicad\\symbols\\/Battery_Management.kicad_sym"))
  (library (logical "Connector")
    (uri "C:\\Program Files\\KiCad\\9.0\\share\\kicad\\symbols\\/Connector.kicad_sym"))
  (library (logical "Device")
    (uri "C:\\Program Files\\KiCad\\9.0\\share\\kicad\\symbols\\/Device.kicad_sym"))
  (library (logical "INMP441")
    (uri "C:\\Users\\ashut\\Downloads\\INMP441\\INMP441.kicad_sym"))
  (library (logical "OV2640")
    (uri "C:\\Users\\ashut\\Downloads\\OV2640\\OV2640.kicad_sym"))
  (library (logical "RF_Module")
    (uri "C:\\Program Files\\KiCad\\9.0\\share\\kicad\\symbols\\/RF_Module.kicad_sym"))
  (library (logical "Regulator_Linear")
    (uri "C:\\Program Files\\KiCad\\9.0\\share\\kicad\\symbols\\/Regulator_Linear.kicad_sym"))
  (library (logical "Regulator_Switching")
    (uri "C:\\Program Files\\KiCad\\9.0\\share\\kicad\\symbols\\/Regulator_Switching.kicad_sym")))
(nets
  (net (code "1") (name "/BOOT") (class "Default")
    (node (ref "CAM1") (pin "11") (pinfunction "DOVDD") (pintype "bidirectional"))
    (node (ref "CAM1") (pin "3") (pinfunction "SIO_D") (pintype "bidirectional"))
    (node (ref "CAM1") (pin "4") (pinfunction "AVDD") (pintype "bidirectional"))
    (node (ref "CAM1") (pin "5") (pinfunction "SIO_C") (pintype "bidirectional"))
    (node (ref "CAM1") (pin "6") (pinfunction "RESET") (pintype "bidirectional"))
    (node (ref "CAM1") (pin "8") (pinfunction "PWDN") (pintype "bidirectional"))
    (node (ref "MK2") (pin "7") (pinfunction "VDD") (pintype "power_in"))
    (node (ref "MK2") (pin "8") (pinfunction "CHIPEN") (pintype "input"))
    (node (ref "U2") (pin "2") (pinfunction "VO") (pintype "power_out"))
    (node (ref "U4") (pin "10") (pinfunction "IO17") (pintype "bidirectional"))
```

```
  (node (ref "U4") (pin "11") (pinfunction "IO18") (pintype "bidirectional"))
  (node (ref "U4") (pin "2") (pinfunction "3V3") (pintype "power_in"))
  (node (ref "U4") (pin "25") (pinfunction "IO48") (pintype "bidirectional"))
  (node (ref "U4") (pin "27") (pinfunction "IO0") (pintype "bidirectional"))
  (node (ref "U4") (pin "3") (pinfunction "EN") (pintype "input"))
  (node (ref "U5") (pin "24") (pinfunction "VREFP") (pintype "input"))
  (node (ref "U5") (pin "48") (pinfunction "DVDD") (pintype "power_in"))
  (node (ref "U5") (pin "50") (pinfunction "DVDD") (pintype "power_in"))
  (node (ref "U5") (pin "54") (pinfunction "AVDD1") (pintype "power_in"))
  (node (ref "U5") (pin "59") (pinfunction "AVDD@2") (pintype "power_in")))
(net (code "2") (name "/CHRG_OUT") (class "Default")
  (node (ref "D1") (pin "1") (pinfunction "K") (pintype "passive"))
  (node (ref "U1") (pin "6") (pinfunction "~{STDBY}") (pintype "open_collector"))
(node (ref "U1") (pin "7") (pinfunction "~{CHRG}") (pintype "open_collector")))
(net (code "3") (name "/SYS_RAW") (class "Default")
  (node (ref "Q1") (pin "1") (pintype "passive"))
  (node (ref "Q1") (pin "2") (pintype "passive"))
  (node (ref "Q1") (pin "3") (pintype "passive"))
  (node (ref "U2") (pin "3") (pinfunction "VI") (pintype "power_in"))
  (node (ref "U3") (pin "5") (pinfunction "IN") (pintype "power_in")))
(net (code "4") (name "/USB_5V") (class "Default")
  (node (ref "P1") (pin "A4") (pinfunction "VBUS") (pintype "passive"))
  (node (ref "P1") (pin "A9") (pinfunction "VBUS") (pintype "passive"))
  (node (ref "P1") (pin "B4") (pinfunction "VBUS") (pintype "passive"))
  (node (ref "P1") (pin "B9") (pinfunction "VBUS") (pintype "passive"))
  (node (ref "R2") (pin "1") (pintype "passive"))
  (node (ref "U1") (pin "4") (pinfunction "V_{CC}") (pintype "power_in")))
(net (code "5") (name "/VBAT") (class "Default")
  (node (ref "BT1") (pin "1") (pinfunction "+") (pintype "passive"))
  (node (ref "Q1") (pin "5") (pintype "passive"))
  (node (ref "Q1") (pin "6") (pintype "passive"))
  (node (ref "Q1") (pin "7") (pintype "passive"))
  (node (ref "Q1") (pin "8") (pintype "passive"))
```

```
    (node (ref "U1") (pin "5") (pinfunction "BAT") (pintype "power_out")))
  (net (code "6") (name "GND") (class "Default")
    (node (ref "BT1") (pin "2") (pinfunction "-") (pintype "passive"))
    (node (ref "CAM1") (pin "15") (pinfunction "DGND") (pintype "bidirectional"))
    (node (ref "CAM1") (pin "2") (pinfunction "AGND") (pintype "bidirectional"))
    (node (ref "CAM1") (pin "MT1") (pinfunction "DGND") (pintype "bidirectional"))
    (node (ref "CAM1") (pin "MT2") (pinfunction "DGND") (pintype "bidirectional"))
    (node (ref "MK2") (pin "4") (pinfunction "L/R") (pintype "input"))
    (node (ref "MK2") (pin "5_1") (pinfunction "GND") (pintype "power_in"))
    (node (ref "MK2") (pin "5_2") (pinfunction "GND") (pintype "power_in"))
    (node (ref "MK2") (pin "6") (pinfunction "GND") (pintype "power_in"))
    (node (ref "MK2") (pin "9") (pinfunction "GND") (pintype "power_in"))
    (node (ref "P1") (pin "A1") (pinfunction "GND") (pintype "passive"))
    (node (ref "P1") (pin "A12") (pinfunction "GND") (pintype "passive"))
    (node (ref "P1") (pin "B1") (pinfunction "GND") (pintype "passive"))
    (node (ref "P1") (pin "B12") (pinfunction "GND") (pintype "passive"))
    (node (ref "R1") (pin "2") (pintype "passive"))
    (node (ref "U1") (pin "1") (pinfunction "TEMP") (pintype "input"))
    (node (ref "U1") (pin "3") (pinfunction "GND") (pintype "power_in"))
    (node (ref "U1") (pin "8") (pinfunction "CE") (pintype "input"))
    (node (ref "U1") (pin "9") (pinfunction "EPAD") (pintype "passive"))
    (node (ref "U2") (pin "1") (pinfunction "GND") (pintype "power_in"))
    (node (ref "U3") (pin "2") (pinfunction "GND") (pintype "power_in"))
    (node (ref "U4") (pin "1") (pinfunction "GND") (pintype "power_in"))
    (node (ref "U4") (pin "40") (pinfunction "GND") (pintype "passive"))
    (node (ref "U4") (pin "41") (pinfunction "GND") (pintype "passive"))
    (node (ref "U5") (pin "20") (pinfunction "AVSS@1") (pintype "power_in"))
    (node (ref "U5") (pin "23") (pinfunction "AVSS@1") (pintype "power_in"))
    (node (ref "U5") (pin "25") (pinfunction "VREFN") (pintype "input"))
    (node (ref "U5") (pin "32") (pinfunction "AVSS@1") (pintype "power_in"))
    (node (ref "U5") (pin "33") (pinfunction "DGND") (pintype "power_in"))
    (node (ref "U5") (pin "49") (pinfunction "DGND") (pintype "power_in"))
    (node (ref "U5") (pin "51") (pinfunction "DGND") (pintype "power_in"))
```

```
  (node (ref "U5") (pin "57") (pinfunction "AVSS@1") (pintype "power_in"))
  (node (ref "U6") (pin "11") (pinfunction "GND") (pintype "power_in"))
  (node (ref "U6") (pin "15") (pinfunction "PGND") (pintype "passive"))
  (node (ref "U6") (pin "2") (pinfunction "PGND") (pintype "power_in")))
(net (code "7") (name "Net-(CAM1-DATA0)") (class "Default")
  (node (ref "CAM1") (pin "24") (pinfunction "DATA0") (pintype "bidirectional"))
  (node (ref "U4") (pin "23") (pinfunction "IO21") (pintype "bidirectional")))
(net (code "8") (name "Net-(CAM1-DATA1)") (class "Default")
  (node (ref "CAM1") (pin "23") (pinfunction "DATA1") (pintype "bidirectional"))
  (node (ref "U4") (pin "28") (pinfunction "IO35") (pintype "bidirectional")))
(net (code "9") (name "Net-(CAM1-DATA2)") (class "Default")
  (node (ref "CAM1") (pin "19") (pinfunction "DATA2") (pintype "bidirectional"))
  (node (ref "U4") (pin "29") (pinfunction "IO36") (pintype "bidirectional")))
(net (code "10") (name "Net-(CAM1-DATA3)") (class "Default")
  (node (ref "CAM1") (pin "21") (pinfunction "DATA3") (pintype "bidirectional"))
  (node (ref "U4") (pin "30") (pinfunction "IO37") (pintype "bidirectional")))
(net (code "11") (name "Net-(CAM1-DATA4)") (class "Default")
  (node (ref "CAM1") (pin "22") (pinfunction "DATA4") (pintype "bidirectional"))
  (node (ref "U4") (pin "31") (pinfunction "IO38") (pintype "bidirectional")))
(net (code "12") (name "Net-(CAM1-DATA5)") (class "Default")
  (node (ref "CAM1") (pin "20") (pinfunction "DATA5") (pintype "bidirectional"))
  (node (ref "U4") (pin "32") (pinfunction "IO39") (pintype "bidirectional")))
(net (code "13") (name "Net-(CAM1-DATA6)") (class "Default")
  (node (ref "CAM1") (pin "18") (pinfunction "DATA6") (pintype "bidirectional"))
  (node (ref "U4") (pin "33") (pinfunction "IO40") (pintype "bidirectional")))
(net (code "14") (name "Net-(CAM1-DATA7)") (class "Default")
  (node (ref "CAM1") (pin "16") (pinfunction "DATA7") (pintype "bidirectional"))
  (node (ref "U4") (pin "34") (pinfunction "IO41") (pintype "bidirectional")))
(net (code "15") (name "Net-(CAM1-HREF)") (class "Default")
  (node (ref "CAM1") (pin "9") (pinfunction "HREF") (pintype "bidirectional"))
(node (ref "U4") (pin "16") (pinfunction "IO46") (pintype "bidirectional")))
(net (code "16") (name "Net-(CAM1-PCLK)") (class "Default")
  (node (ref "CAM1") (pin "17") (pinfunction "PCLK") (pintype "bidirectional"))
```

(node (ref "U4") (pin "35") (pinfunction "IO42") (pintype "bidirectional")))
(net (code "17") (name "Net-(CAM1-VSYNC)") (class "Default")
(node (ref "CAM1") (pin "7") (pinfunction "VSYNC") (pintype "bidirectional"))
(node (ref "U4") (pin "24") (pinfunction "IO47") (pintype "bidirectional")))
(net (code "18") (name "Net-(CAM1-XCLK)") (class "Default")
(node (ref "CAM1") (pin "13") (pinfunction "XCLK") (pintype "bidirectional"))
(node (ref "U4") (pin "26") (pinfunction "IO45") (pintype "bidirectional")))
(net (code "19") (name "Net-(D1-A)") (class "Default")
(node (ref "D1") (pin "2") (pinfunction "A") (pintype "passive"))
(node (ref "R2") (pin "2") (pintype "passive")))
(net (code "20") (name "Net-(MK2-SCK)") (class "Default")
(node (ref "MK2") (pin "1") (pinfunction "SCK") (pintype "input"))
(node (ref "U4") (pin "9") (pinfunction "IO16") (pintype "bidirectional")))
(net (code "21") (name "Net-(MK2-SD)") (class "Default")
(node (ref "MK2") (pin "2") (pinfunction "SD") (pintype "bidirectional"))
(node (ref "U4") (pin "22") (pinfunction "IO14") (pintype "bidirectional")))
(net (code "22") (name "Net-(MK2-WS)") (class "Default")
(node (ref "MK2") (pin "3") (pinfunction "WS") (pintype "input"))
(node (ref "U4") (pin "8") (pinfunction "IO15") (pintype "bidirectional")))
(net (code "23") (name "Net-(U1-PROG)") (class "Default")
(node (ref "R1") (pin "1") (pintype "passive"))
(node (ref "U1") (pin "2") (pinfunction "PROG") (pintype "passive")))
(net (code "24") (name "Net-(U3-SW)") (class "Default")
(node (ref "U3") (pin "1") (pinfunction "SW") (pintype "passive"))
(node (ref "U6") (pin "6") (pinfunction "VDD") (pintype "power_in")))
(net (code "25") (name "Net-(U4-IO4)") (class "Default")
(node (ref "U4") (pin "4") (pinfunction "IO4") (pintype "bidirectional"))
(node (ref "U5") (pin "40") (pinfunction "SCLK") (pintype "input")))
(net (code "26") (name "Net-(U4-IO5)") (class "Default")
(node (ref "U4") (pin "5") (pinfunction "IO5") (pintype "bidirectional"))
(node (ref "U5") (pin "47") (pinfunction "~{DRDY}") (pintype "output")))
(net (code "27") (name "Net-(U4-IO6)") (class "Default")
(node (ref "U4") (pin "6") (pinfunction "IO6") (pintype "bidirectional"))

(node (ref "U5") (pin "39") (pinfunction "~{CS}") (pintype "input")))
(net (code "28") (name "Net-(U4-IO7)") (class "Default")
(node (ref "U4") (pin "7") (pinfunction "IO7") (pintype "bidirectional"))
(node (ref "U5") (pin "34") (pinfunction "DIN") (pintype "input")))
(net (code "29") (name "Net-(U4-IO8)") (class "Default")
(node (ref "U4") (pin "12") (pinfunction "IO8") (pintype "bidirectional"))
(node (ref "U5") (pin "43") (pinfunction "DOUT") (pintype "output")))
(net (code "30") (name "Net-(U4-IO9)") (class "Default")
(node (ref "U4") (pin "17") (pinfunction "IO9") (pintype "bidirectional"))
(node (ref "U6") (pin "3") (pinfunction "LOUT-") (pintype "output")))
(net (code "31") (name "Net-(U4-IO10)") (class "Default")
(node (ref "U4") (pin "18") (pinfunction "IO10") (pintype "bidirectional"))
(node (ref "U6") (pin "1") (pinfunction "LOUT+") (pintype "output")))
(net (code "32") (name "Net-(U4-IO11)") (class "Default")
(node (ref "U4") (pin "19") (pinfunction "IO11") (pintype "bidirectional"))
(node (ref "U6") (pin "12") (pinfunction "~{SHDN}") (pintype "input")))
(net (code "33") (name "Net-(U4-IO12)") (class "Default")
(node (ref "U4") (pin "20") (pinfunction "IO12") (pintype "bidirectional"))
(node (ref "U6") (pin "10") (pinfunction "INR") (pintype "input")))
(net (code "34") (name "Net-(U4-IO13)") (class "Default")
(node (ref "U4") (pin "21") (pinfunction "IO13") (pintype "bidirectional"))
(node (ref "U6") (pin "7") (pinfunction "INL") (pintype "input")))
(net (code "35") (name "Net-(U5-AVDD@1-Pad19)") (class "Default")
(node (ref "U5") (pin "19") (pinfunction "AVDD@1") (pintype "power_in"))
(node (ref "U5") (pin "21") (pinfunction "AVDD@1") (pintype "power_in"))
(node (ref "U5") (pin "22") (pinfunction "AVDD@1") (pintype "power_in"))
(node (ref "U5") (pin "56") (pinfunction "AVDD@1") (pintype "power_in")))
(net (code "36") (name "Net-(U6-PVDD-Pad13)") (class "Default")
(node (ref "U6") (pin "13") (pinfunction "PVDD") (pintype "passive"))
(node (ref "U6") (pin "4") (pinfunction "PVDD") (pintype "power_in")))
(net (code "37") (name "unconnected-(CAM1-DATA8-Pad14)") (class "Default")
(node (ref "CAM1") (pin "14") (pinfunction "DATA8") (pintype "bidirectional")))
(net (code "38") (name "unconnected-(CAM1-DATA9-Pad12)") (class "Default")

(node (ref "CAM1") (pin "12") (pinfunction "DATA9") (pintype "bidirectional")))
(net (code "39") (name "unconnected-(CAM1-DVDD-Pad10)") (class "Default")
(node (ref "CAM1") (pin "10") (pinfunction "DVDD") (pintype "bidirectional")))
(net (code "40") (name "unconnected-(CAM1-STROBE-Pad1)") (class "Default")
(node (ref "CAM1") (pin "1") (pinfunction "STROBE") (pintype "bidirectional")))
(net (code "41") (name "unconnected-(P1-CC-PadA5)") (class "Default")
(node (ref "P1") (pin "A5") (pinfunction "CC") (pintype "bidirectional")))
(net (code "42") (name "unconnected-(P1-D+-PadA6)") (class "Default")
(node (ref "P1") (pin "A6") (pinfunction "D+") (pintype "bidirectional")))
(net (code "43") (name "unconnected-(P1-D--PadA7)") (class "Default")
(node (ref "P1") (pin "A7") (pinfunction "D-") (pintype "bidirectional")))
(net (code "44") (name "unconnected-(P1-SHIELD-PadS1)") (class "Default")
(node (ref "P1") (pin "S1") (pinfunction "SHIELD") (pintype "passive")))
(net (code "45") (name "unconnected-(P1-VCONN-PadB5)") (class "Default")
(node (ref "P1") (pin "B5") (pinfunction "VCONN") (pintype "bidirectional")))
(net (code "46") (name "unconnected-(Q1-Pad4)") (class "Default")
(node (ref "Q1") (pin "4") (pintype "passive")))
(net (code "47") (name "unconnected-(U3-EN-Pad4)") (class "Default")
(node (ref "U3") (pin "4") (pinfunction "EN") (pintype "input")))
(net (code "48") (name "unconnected-(U3-FB-Pad3)") (class "Default")
(node (ref "U3") (pin "3") (pinfunction "FB") (pintype "input")))
(net (code "49") (name "unconnected-(U3-NC-Pad6)") (class "Default")
(node (ref "U3") (pin "6") (pinfunction "NC") (pintype "no_connect")))
(net (code "50") (name "unconnected-(U4-IO1-Pad39)") (class "Default")
(node (ref "U4") (pin "39") (pinfunction "IO1") (pintype "bidirectional")))
(net (code "51") (name "unconnected-(U4-IO2-Pad38)") (class "Default")
(node (ref "U4") (pin "38") (pinfunction "IO2") (pintype "bidirectional")))
(net (code "52") (name "unconnected-(U4-IO3-Pad15)") (class "Default")
(node (ref "U4") (pin "15") (pinfunction "IO3") (pintype "bidirectional")))
(net (code "53") (name "unconnected-(U4-RXD0-Pad36)") (class "Default")
(node (ref "U4") (pin "36") (pinfunction "RXD0") (pintype "bidirectional")))
(net (code "54") (name "unconnected-(U4-TXD0-Pad37)") (class "Default")
(node (ref "U4") (pin "37") (pinfunction "TXD0") (pintype "bidirectional")))

(net (code "55") (name "unconnected-(U4-USB_D+-Pad14)") (class "Default")
(node (ref "U4") (pin "14") (pinfunction "USB_D+") (pintype "bidirectional")))
(net (code "56") (name "unconnected-(U4-USB_D--Pad13)") (class "Default")
(node (ref "U4") (pin "13") (pinfunction "USB_D-") (pintype "bidirectional")))
(net (code "57") (name "unconnected-(U5-AVSS1-Pad53)") (class "Default")
(node (ref "U5") (pin "53") (pinfunction "AVSS1") (pintype "power_in")))
(net (code "58") (name "unconnected-(U5-AVSS@2-Pad58)") (class "Default")
(node (ref "U5") (pin "58") (pinfunction "AVSS@2") (pintype "power_in")))
(net (code "59") (name "unconnected-(U5-BIASIN-Pad62)") (class "Default")
(node (ref "U5") (pin "62") (pinfunction "BIASIN") (pintype "input")))
(net (code "60") (name "unconnected-(U5-BIASINV-Pad61)") (class "Default")
(node (ref "U5") (pin "61") (pinfunction "BIASINV") (pintype "input")))
(net (code "61") (name "unconnected-(U5-BIASOUT-Pad63)") (class "Default")
(node (ref "U5") (pin "63") (pinfunction "BIASOUT") (pintype "output")))
(net (code "62") (name "unconnected-(U5-BIASREF-Pad60)") (class "Default")
(node (ref "U5") (pin "60") (pinfunction "BIASREF") (pintype "input")))
(net (code "63") (name "unconnected-(U5-CLK-Pad37)") (class "Default")
(node (ref "U5") (pin "37") (pinfunction "CLK") (pintype "input")))
(net (code "64") (name "unconnected-(U5-CLKSEL-Pad52)") (class "Default")
(node (ref "U5") (pin "52") (pinfunction "CLKSEL") (pintype "input")))
(net (code "65") (name "unconnected-(U5-DAISY_IN-Pad41)") (class "Default")
(node (ref "U5") (pin "41") (pinfunction "DAISY_IN") (pintype "input")))
(net (code "66") (name "unconnected-(U5-GPIO1-Pad42)") (class "Default")
(node (ref "U5") (pin "42") (pinfunction "GPIO1") (pintype "bidirectional")))
(net (code "67") (name "unconnected-(U5-GPIO2-Pad44)") (class "Default")
(node (ref "U5") (pin "44") (pinfunction "GPIO2") (pintype "bidirectional")))
(net (code "68") (name "unconnected-(U5-GPIO3-Pad45)") (class "Default")
(node (ref "U5") (pin "45") (pinfunction "GPIO3") (pintype "bidirectional")))
(net (code "69") (name "unconnected-(U5-GPIO4-Pad46)") (class "Default")
(node (ref "U5") (pin "46") (pinfunction "GPIO4") (pintype "bidirectional")))
(net (code "70") (name "unconnected-(U5-IN1N-Pad15)") (class "Default")
(node (ref "U5") (pin "15") (pinfunction "IN1N") (pintype "input")))
(net (code "71") (name "unconnected-(U5-IN1P-Pad16)") (class "Default")

```
  (node (ref "U5") (pin "16") (pinfunction "IN1P") (pintype "input")))
(net (code "72") (name "unconnected-(U5-IN2N-Pad13)") (class "Default")
  (node (ref "U5") (pin "13") (pinfunction "IN2N") (pintype "input")))
(net (code "73") (name "unconnected-(U5-IN2P-Pad14)") (class "Default")
  (node (ref "U5") (pin "14") (pinfunction "IN2P") (pintype "input")))
(net (code "74") (name "unconnected-(U5-IN3N-Pad11)") (class "Default")
  (node (ref "U5") (pin "11") (pinfunction "IN3N") (pintype "input")))
(net (code "75") (name "unconnected-(U5-IN3P-Pad12)") (class "Default")
  (node (ref "U5") (pin "12") (pinfunction "IN3P") (pintype "input")))
(net (code "76") (name "unconnected-(U5-IN4N-Pad9)") (class "Default")
  (node (ref "U5") (pin "9") (pinfunction "IN4N") (pintype "input")))
(net (code "77") (name "unconnected-(U5-IN4P-Pad10)") (class "Default")
  (node (ref "U5") (pin "10") (pinfunction "IN4P") (pintype "input")))
(net (code "78") (name "unconnected-(U5-IN5N-Pad7)") (class "Default")
  (node (ref "U5") (pin "7") (pinfunction "IN5N") (pintype "input")))
(net (code "79") (name "unconnected-(U5-IN5P-Pad8)") (class "Default")
  (node (ref "U5") (pin "8") (pinfunction "IN5P") (pintype "input")))
(net (code "80") (name "unconnected-(U5-IN6N-Pad5)") (class "Default")
  (node (ref "U5") (pin "5") (pinfunction "IN6N") (pintype "input")))
(net (code "81") (name "unconnected-(U5-IN6P-Pad6)") (class "Default")
  (node (ref "U5") (pin "6") (pinfunction "IN6P") (pintype "input")))
(net (code "82") (name "unconnected-(U5-IN7N-Pad3)") (class "Default")
  (node (ref "U5") (pin "3") (pinfunction "IN7N") (pintype "input")))
(net (code "83") (name "unconnected-(U5-IN7P-Pad4)") (class "Default")
  (node (ref "U5") (pin "4") (pinfunction "IN7P") (pintype "input")))
(net (code "84") (name "unconnected-(U5-IN8N-Pad1)") (class "Default")
  (node (ref "U5") (pin "1") (pinfunction "IN8N") (pintype "input")))
(net (code "85") (name "unconnected-(U5-IN8P-Pad2)") (class "Default")
  (node (ref "U5") (pin "2") (pinfunction "IN8P") (pintype "input")))
(net (code "86") (name "unconnected-(U5-RESERVED-Pad64)") (class "Default")
  (node (ref "U5") (pin "64") (pinfunction "RESERVED") (pintype "output")))
(net (code "87") (name "unconnected-(U5-RESV1-Pad31)") (class "Default")
  (node (ref "U5") (pin "31") (pinfunction "RESV1") (pintype "input")))
```

(net (code "88") (name "unconnected-(U5-SRB1-Pad17)") (class "Default")
(node (ref "U5") (pin "17") (pinfunction "SRB1") (pintype "bidirectional")))
(net (code "89") (name "unconnected-(U5-SRB2-Pad18)") (class "Default")
(node (ref "U5") (pin "18") (pinfunction "SRB2") (pintype "bidirectional")))
(net (code "90") (name "unconnected-(U5-START-Pad38)") (class "Default")
(node (ref "U5") (pin "38") (pinfunction "START") (pintype "input")))
(net (code "91") (name "unconnected-(U5-VCAP1-Pad28)") (class "Default")
(node (ref "U5") (pin "28") (pinfunction "VCAP1") (pintype "output")))
(net (code "92") (name "unconnected-(U5-VCAP2-Pad30)") (class "Default")
(node (ref "U5") (pin "30") (pinfunction "VCAP2") (pintype "output")))
(net (code "93") (name "unconnected-(U5-VCAP3-Pad55)") (class "Default")
(node (ref "U5") (pin "55") (pinfunction "VCAP3") (pintype "bidirectional")))
(net (code "94") (name "unconnected-(U5-VCAP4-Pad26)") (class "Default")
(node (ref "U5") (pin "26") (pinfunction "VCAP4") (pintype "bidirectional")))
(net (code "95") (name "unconnected-(U5-~{PWDN}-Pad35)") (class "Default")
(node (ref "U5") (pin "35") (pinfunction "~{PWDN}") (pintype "input")))
(net (code "96") (name "unconnected-(U5-~{RESET}-Pad36)") (class "Default")
(node (ref "U5") (pin "36") (pinfunction "~{RESET}") (pintype "input")))
(net (code "97") (name "unconnected-(U6-NC-Pad9)") (class "Default")
(node (ref "U6") (pin "9") (pinfunction "NC") (pintype "no_connect")))
(net (code "98") (name "unconnected-(U6-ROUT+-Pad16)") (class "Default")
(node (ref "U6") (pin "16") (pinfunction "ROUT+") (pintype "output")))
(net (code "99") (name "unconnected-(U6-ROUT--Pad14)") (class "Default")
(node (ref "U6") (pin "14") (pinfunction "ROUT-") (pintype "output")))
(net (code "100") (name "unconnected-(U6-VREF-Pad8)") (class "Default")
(node (ref "U6") (pin "8") (pinfunction "VREF") (pintype "input")))
(net (code "101") (name "unconnected-(U6-~{MUTE}-Pad5)") (class "Default")
(node (ref "U6") (pin "5") (pinfunction "~{MUTE}") (pintype "input")))))