

PÚCA DSP - Datasheet

PÚCA DSP is an open source, Arduino compatible ESP32 development board for audio and digital signal processing (DSP) applications.

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1. Functional Description

PÚCA DSP is an open source, Arduino compatible ESP32 development board for audio and digital signal processing (DSP) applications. It offers a fully functional feature set for audio processing on a small format breadboard friendly device, and includes audio inputs and audio outputs, a low-noise microphone array, integrated test speaker option, additional memory, battery charge management and ESD protection on an integrated device.

2. Features & Specifications

Processor & Memory

- Espressif ESP32 Pico D4 Processor
- 32-bit dual core 80MHZ / 160MHZ / 240MHZ
- 4MB SPI Flash with 8MB additional PSRAM or 16MB External SPI Flash
- Wireless 2.4GHz Wi-Fi -802.11b/g/n
- Bluetooth BLE 4.2
- 3D Antenna

Audio

- Wolfson WM9878 Stereo Audio Codec
- Audio Line In on stereo 3.5mm connector
- Audio Headphone / Line Out on stereo 3.5mm connector
- Stereo Aux Line In, Audio Mono Out routed to GPIO Header
- 2 x Knowles SPM0687LR5H-1 MEMS Microphones
- ESD protection on all audio inputs and outputs
- Support for 8, 11.025, 12, 16, 22.05, 24, 32, 44.1 and 48kHz sample rates
- 1W Speaker Driver, routed to GPIO Header

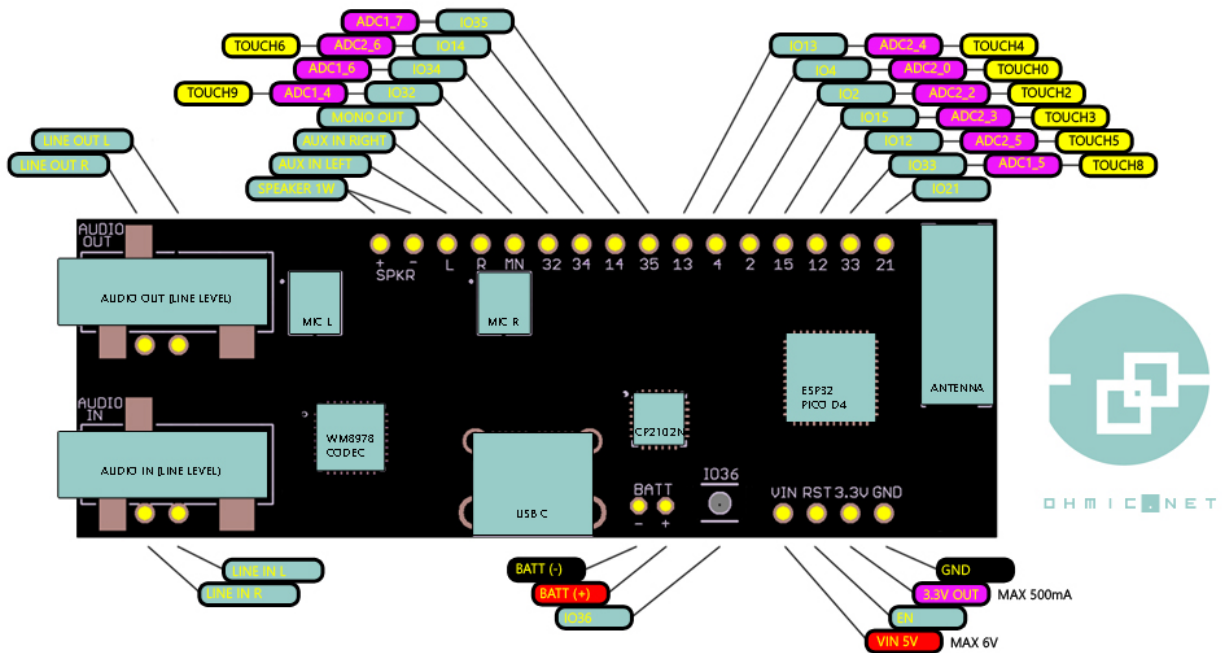
Form Factor and Connectivity

- Breadboard friendly
- 70mm x 24mm
- 11 x GPIO pins broken out to 2.54mm pitch header, with access to both ESP32 ADC channels, JTAG and capacitive touch pins
- USB 2.0 over USB Type C connector

Power

- 3.7/4.2v Lithium Polymer Rechargeable Battery, USB or external 5V DC power source
- ESP32 and Audio Codec can be placed into low power modes under software control
- Battery voltage level detection via solder jumper
- ESD protection on USB data bus

3. Pin Layout



4. Pin Description

Pin Number	Function
VIN	Input Voltage, (3.4V ~ 5.8V)
RST	EN (High: On; enables the ESP32 module Low: Off; the ESP32 module powers off)
VDD	3.3V Digital Output Voltage (< 500mA)
GND	Ground
21	GPIO21, VSPIHD, EMAC_TX_EN
33	GPIO33, 32K_XN (32.768 kHz crystal oscillator output), ADC1_CH5, TOUCH8, RTC_GPIO8
12	GPIO12, ADC2_CH5, TOUCH5, RTC_GPIO15, MTDI, HSPICQ, HS2_DATA2, SD_DATA2, EMAC_TXD3
15	GPIO15, ADC2_CH3, TOUCH3, RTC_GPIO13, MTDO, HSPICS0, HS2_CMD, SD_CMD, EMAC_RXD3
2	GPIO2, ADC2_CH2, TOUCH2, RTC_GPIO12, HSPIWIP, HS2_DATA0, SD_DATA0
4	GPIO4, ADC2_CH0, TOUCH0, RTC_GPIO10, HSPIHHD, HS2_DATA1, SD_DATA1, EMAC_TX_ER
13	GPIO13, ADC2_CH4, TOUCH4, RTC_GPIO14, MTCK, HSPID, HS2_DATA3, SD_DATA3, EMAC_RX_ER

35	GPIO35, ADC1_CH7, RTC_GPIO5
14	GPIO14, ADC2_CH6, TOUCH6, RTC_GPIO16, MTMS, HSPICLK, HS2_CLK, SD_CLK, EMAC_TXD2
34	GPIO34, ADC1_CH6, RTC_GPIO4
32	GPIO32, 32K_XP (32.768 kHz crystal oscillator input), ADC1_CH4, TOUCH9, RTC_GPIO9
MN	WM8978 Mono Output (OUT4)
R	WM8978 Auxiliary Input, Right (AUXR)
L	WM8978 Auxiliary Input, Left (AUXL)
SPKR -	WM8978 Speaker Output (ROUT2)
SPKR +	WM8978 Speaker Output (LOUT2)
VCC	3.3V Analogue Output Voltage (< 500mA)

5. Electrical Characteristics

5.1 Absolute Maximim Ratings

Stresses beyond the absolute maximum ratings listed in the table below may cause permanent damage to the device. These are stress ratings only, and do not refer to the functional operation of the device, which should follow the recommended operating conditions. Operating this device outside of the recommended operating conditions is not recommended and may result in unexpected behaviour.

5.2 Recommended Operating Conditions

Parameter	Min	Max	Unit
Input Voltage	2.5	5.8	Volts (V)
Current	0.3	0.7	Amps (A)
Operating Temperature	-20	40	Degrees Celsius (°C)

5.3 Current Consumption Characteristics

Current Consumption Scenario	Current (mA)
ESP32 and WM8978 Active, Wifi On	130
ESP32 and WM8978 Active, Wifi Off	100

ESP32 Active, WM8978 Standby, Wifi Off	52.4
ESP32 Deep Sleep, WM8978 Standby	5.7

6. Physical Dimensions

Width	70 mm
Depth	24 mm
Height*	20 mm
Weight	0.12 kgs

*with pin headers soldered

7. Product Handling

The product is shipped in a sealed antistatic bag and should be stored in a noncondensing atmospheric environment of < 40 °C / 90% RH.

8. Learning Resources

Please visit github.com/ohmic-net to access learning resources and example firmware applications.

9.CE Declaration of Conformity

CE declaration of conformity can be downloaded from <http://github.com/ohmic-net>

10. Schematic Diagram

Schematic Diagram in pdf format can be downloaded from <http://github.com/ohmic-net>

11.Document Revision History

Document Revision No.	Date	Signed
v1.0	29/02/22	AW
V1.1	01/11/22	AW

