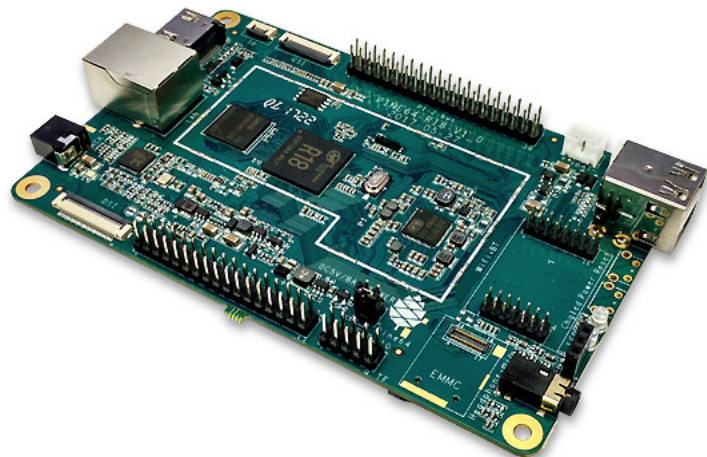# PINE A64-LTS/SOPine

The **PINE64-LTS** is the long term supply version of the PINE A64 (+), *PINE64's* first single board computer, powered by Allwinner's A64 quad-core ARM Cortex A53 64-Bit SoC. There are many operating systems available for the PINE A64-LTS created by the open source community and various partner projects. The PINE A64-LTS is guaranteed to be supplied until the year 2025 at the very least.

The **SOPINE A64** is a compute module powered by the same Quad-Core ARM Cortex A53 64-Bit Processor used in the PINE A64 with 2G LPDDR3 RAM memory, Power Management Unit, SPI Flash and integrated MicroSD Slot (for bootable OS images microSD card). The SOPINE module has a 5 years LTS (Long Term Supply) status, which means that it will be supplied to 2022 at the very least. There is a one year warranty period for the SOPINE module. This tiny compute module uses SODIMM-DDR3 form-factor and can be paired with either the Clusterboard, the Baseboard or a custom host PCB for industrial or other embedded applications. It is fully compatible with the PINE A64-LTS in terms of software support

The PINE A64-LTS
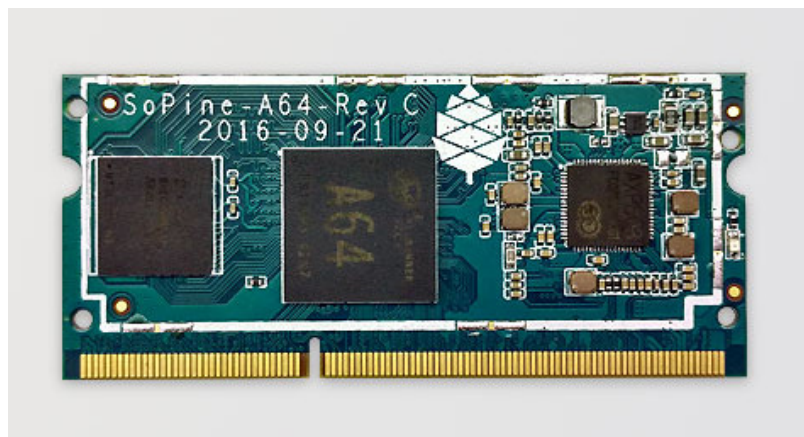
The SOPINE A64

Contents

Network
Storage
Expansion Ports

**Pine A64-LTS, SOPine Module
and Baseboard Information,
Schematics, and Certifications**

**Datasheets for Components and
Peripherals**

Pine A64 POT

Other Resources

Software releases

Important: The SOPine operating system images are compatible with PINE A64-LTS.

Please see SOPINE Software Release for a complete list of currently supported operating system images that work with the SOPine, as well as other related software. For a quick reference, the list includes the following operating system images:

- Armbian
- AOSC
- OpenEmbedded/Yocto
- OpenWRT
- Volumio 2 Digital Audio Player
- FreedomBox
- LibreELEC (KODI)
- NetBSD
- Android 6.x / Android 5.x.

Below is a list of links to the build sources and environments for some operating system images. Some of them are labelled as **beta or nightly builds**, which means they are fit for testing purposes only. Those images should be used at your own risk and are not fit for regular use.

- longsleep BSP Linux (https://www.stdin.xyz/downloads/people/longsleep/pine64-images/)
- ayufan Linux (https://github.com/ayufan-pine64/linux-build/releases/latest/)
- ayufan Android 7.1 (https://github.com/ayufan-pine64/android-7.1/releases/latest/), Android 6.0 (https://github.com/ayufan-pine64/android-6.0/releases/latest/), and Android 5.1 (https://github.com/ayufan-pine64/android-5.1/releases/latest/)
- openSUSE (https://pine64suse.weebly.com/download.html)
- SOPINE Armbian (https://dl.armbian.com/pine64so/archive/)
- Arch Linux XFCE (https://github.com/anarsoul/linux-build/releases/latest)
- OpenMediaVault (https://sourceforge.net/projects/openmediavault/files/Other%20armhf%20images/)

Accessories and Step-by-Step Guides

Please see Accessories Step by Step Guides for a list of guides for Pine A64 accessories; there you can find instructions and guides about the following:

- Enclosures

- Bluetooth and WiFi module
- Real Time Clock (RTC) battery
- Real Time Clock (RTC) battery holder
- First and third party cases
- Featured 3D printed cases (and more)

SoC and Memory Specification

- Based on Allwinner A64/R18
  - **R18 and A64 are identical SoC but R18 committed for 10 years supply by vendor.**

CPU Architecture

- Quad-core ARM Cortex-A53 Processor@1152Mhz (https://www.arm.com/products/proce ssors/cortex-a/cortex-a53-processor.php)
- A power-efficient ARM v8 architecture
- 64 and 32bit execution states for scalable high performance
- Support NEON Advanced SIMD (Single Instruction Multiple Data) instruction for acceleration of media and signal processing function
- Support Large Physical Address Extensions(LPAE)
- VFPv4 Floating Point Unit
- 32KB L1 Instruction cache and 32KB L1 Data cache
- 512KB L2 cache

GPU Architecture

- ARM Mali400MP2 Dual-core GPU (https://www.arm.com/products/multimedia/mali-gpu/ultra-low-pow er/mali-400.php)
- Support OpenGL ES 2.0 and OpenVG 1.1 standard

System Memory

- RAM Memory Variants: 2GB LPDDR3.
- Storage Memory: 128Mb SPI Flash and optional eMMC module from 16GB up to 128GB

PINE A64-LTS Board Features

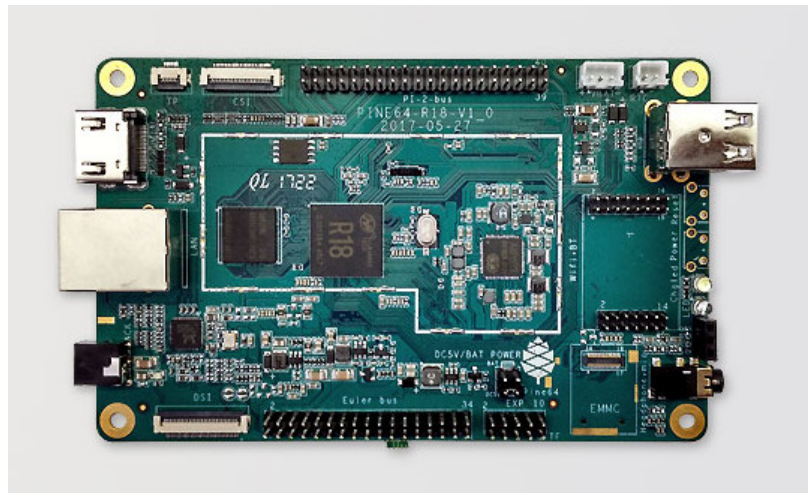## Video

- Digital Video (Type A - full)

Audio

- 3.5mm stereo earphone/microphone plug

Network

- 10/100/1000Mbps Ethernet(PINE A64+ version), 10/100Mbps Ethernet(PINE A64 version)
- WiFi 802.11 b/g/n with Bluetooth 4.0 (optional)

Storage

- microSD - bootable, support SDHC and SDXC, storage up to 256GB
- USB - 2 USB2.0 Host port

Expansion Ports

- DSI - Display Serial Interface, 4 lanes MiPi, up to 1080P
- CSI - CMOS Camera Interface up to 5 mega pixel
- TP - Touch Panel Port, SPI with interrupt
- RTC - Real Time Clock Battery Connector
- VBAT - Lithium Battery Connector with temperature sensor input
- Wifi/BT Module Header - SDIO 3.0 and UART
- 2x20 pins "Pi2" GPIO Header
- 2x17 pins "Euler" GPIO Header
- 2x5 pins "EXP" Console Header

Front view of a Pine A64-LTS board
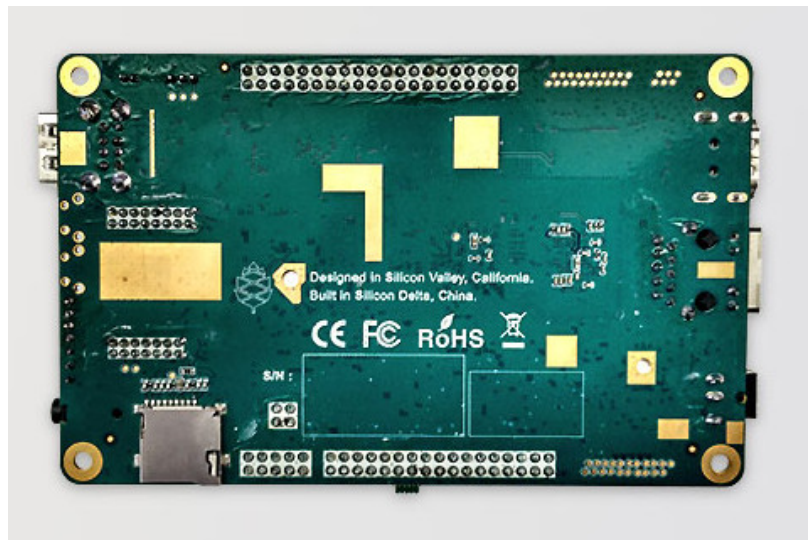
Rear view of a Pine A64-LTS board

Pine A64-LTS, SOPine Module and Baseboard Information, Schematics, and Certifications

- Model "A" Baseboard Dimensions: 133mm x 80mm x 19mm
- Input Power: DC 5V @ 2A, 3.7V Li-Ion battery connector, 3.5OD/1.35ID Barrel DC Jack connector, Euler connector
- PINE A64 Connector Layout @courtesy of norm24 (https://wiki.pine64.org/images/7/7d/Pine64_Board_Connector.png)
- PINE A64 Connector List (https://wiki.pine64.org/images/d/da/Pine64_Connector.JPG)
- SOPine Module Pin Assignment ver 1.0 (https://files.pine64.org/doc/SOPINE-A64/SOPINE-A64-Pin-Assignments-ver-1.0.pdf)
- a PDF mapping the pins from the A64 chip itself, to the gold-fingers on the SO-DIMM edge, to the multiple connectors on the baseboard and on the clusterboard, attached to this forum post. (https://forum.pine64.org/showthread.php?tid=8058)

- PINE A64 Pi-2/Eular/Ext Bus/Wifi Bus Connector Pin Assignment (Updated 15/Feb/2016) (https://file s.pine64.org/doc/Pine%20A64%20S chematic/Pine%20A64%20Pin%20A ssignment%20160119.pdf)

  - Good documentation about PINE A64, A64+, and A64-LTS GPIO pins article (https://synfare.com/ 599N105E/hwdocs/pine64/inde x.html)

- Pine A64-LTS Schematic:

  - Pine A64-LTS Schematic (https:// files.pine64.org/doc/SOPINE-A64 /PINE%20A64-TLS-20180130.pd f)

- SOPine Module Schematic:

  - SOPine Module Schematic (http s://files.pine64.org/doc/SOPINE- A64/SOPINE-A64-Schematic-ver- 0.9.pdf)

- SOPine Model "A" Baseboard Schematic and PCB Board Resource:

  - **SOPine model "A" Baseboard is an hardware open source project but is not "OSH" compliant**

  - SOPine Model "A" Baseboard Schematic capture Rev B DSN source file (https://files.pine64.o rg/doc/SOPINE-A64/SOPine%20B aseboard%20Model%20A%20Re v%20B20170207.DSN)

  - SOPine Model "A" Baseboard Schematic Rev B PDF file (http s://files.pine64.org/doc/SOPINE- A64/SOPine%20Baseboard%20 Model%20A%20Rev%20B20170 207.pdf)
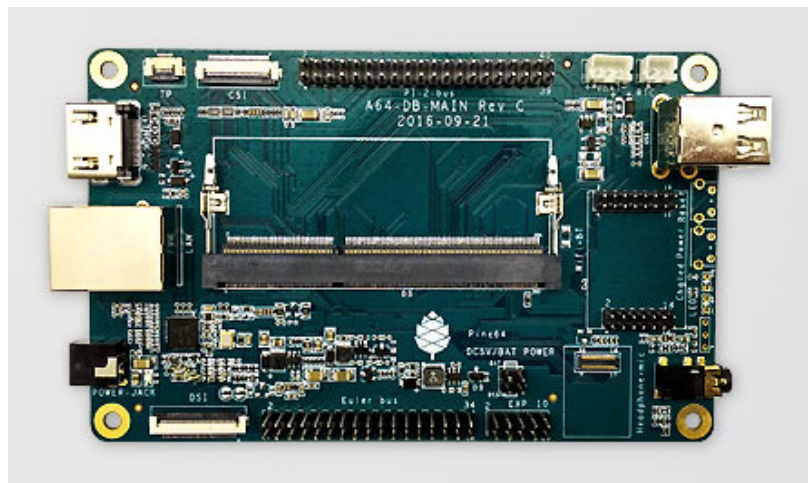
  - SOPine Model "A" Baseboard PCB Job source file (https://files. pine64.org/doc/SOPINE-A64/SOP ine%20Model%20A%20baseboa rd%20PCB%20layout%20PCB%2 0Job.tar)

  - SOPine Model "A" Baseboard PCB Gerber file (https://files.pin e64.org/doc/SOPINE-A64/SOPine%20Model%20A%20basedboard%20GERBER.tar)

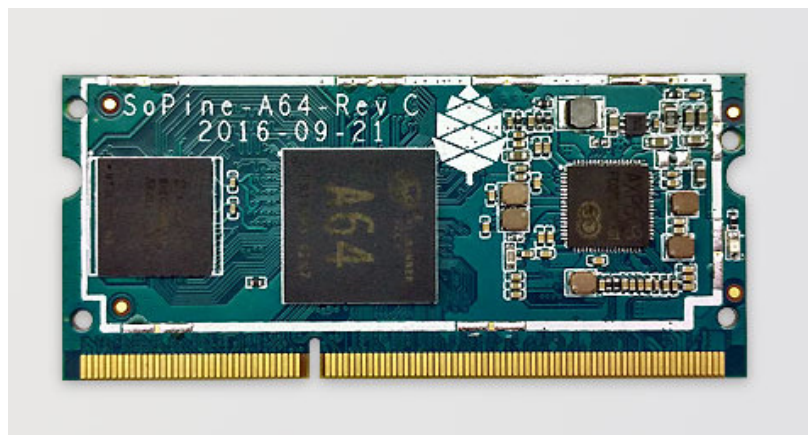 - SOPine Model "A" Baseboard PCB Layout PDF file (https://files.pine64.org/doc/SOPINE-A64/SOPin e%20Model%20A%20baseboard%20PCB%20layout%20PDF.tar)
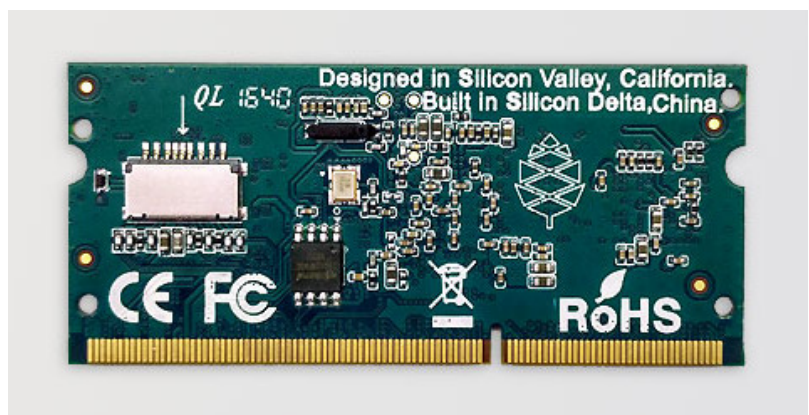
- PINE A64-LTS / SOPine Wifi/BT module Schematic

  - PINE A64 Wifi/BT Module Schematic (https://files.pine64.org/doc/Pine%20A64%20Schematic/A64-

Front view of a SOPine Baseboard

Front view of a SOPine module

Rear view of a SOPine module

DB-WIFI-BT-REV%20B.pdf)
- PINE A64-LTS / SOPine Stereo Audio Dac Board Schematic
  - PINE A64-LTS / SOPine Stereo Audio Dac Board Schematic (https://forum.pine64.org/attachment.p hp?aid=697)
- SOPine (together with model "A" baseboard) Certification:
  - Disclaimer: Please note that PINE64 SBC is not a "final" product and in general certification is not necessary. However, PINE64 still submits the SBC for FCC, CE, and ROHS certifications and obtain the certificates to prove that the SBC board can pass the testing. Please note, a final commercial product needs to perform its own testing and obtain its own certificate.
  - SOPine with model "A" baseboard FCC Certificate (https://files.pine64.org/doc/cert/SOPine%20FC C%20certification%20VOC20170428.pdf)
  - SOPine with model "A" baseboard CE Certificate (https://files.pine64.org/doc/cert/SOPine%20CE% 20certification%20VOC20170428.pdf)
  - SOPine with model "A" baseboard RoHS Certificate (https://files.pine64.org/doc/cert/SOPine%20R OHS%20certification%20VOC20170322.pdf)

Datasheets for Components and Peripherals

- Allwinner A64/R18 SoC information:
  - **R18 and A64 are identical SoC but R18 committed for 10 years supply by vendor.**
  - Allwinner A64 SoC Brief Introduction (https://files.pine64.org/doc/datasheet/pine64/A64%20brie f%20v1.0%2020150323.pdf)
  - Allwinner R18 SoC Brief Introduction (https://files.pine64.org/doc/datasheet/pine64/Allwinner-R18 -Brief%20Sheet.pdf)
  - Allwinner A64/R18 SoC Data Sheet V1.1 (Official Released Version) (https://files.pine64.org/doc/d atasheet/pine64/A64_Datasheet_V1.1.pdf)
  - Allwinner A64/R18 SoC User Manual V1.0 (Official Release Version) (https://files.pine64.org/doc/d atasheet/pine64/Allwinner_A64_User_Manual_V1.0.pdf)
- X-Powers AXP803 PMU (Power Management Unit) information:
  - AXP803 PMIC Datasheet (https://files.pine64.org/doc/datasheet/pine64/AXP803_Datasheet_V1.0. pdf)
- LPDDR3 information:
  - Allwinner LPDDR3 Datasheet (https://files.pine64.org/doc/datasheet/pine64/AWL3A1632_mobile_l pddr3_1600Mbps.pdf)
  - Foresee LPDDR3 Datasheet (https://files.pine64.org/doc/datasheet/pine64/FORESEE%20178ball% 2012x11.5%20LPDDR3%2016G%20Spec%20V1.0-1228.pdf)
  - Samsung LPDDR3 Datasheet (https://files.pine64.org/doc/datasheet/pine64/K4E6E304EE-EGCE.p df)
  - Hynix LPDDR3 Datasheet (https://files.pine64.org/doc/datasheet/pine64/LPDDR3%20178ball%20 8Gb_H9CCNNN8JTALAR_Rev1.0.pdf)
- eMMC information:
  - PINE64 eMMC module schematic (https://files.pine64.org/doc/rock64/PINE64_eMMC_Module_2017 0719.pdf)
  - PINE64 USB adapter for eMMC module V2 schematic (https://files.pine64.org/doc/rock64/usb%20 emmc%20module%20adapter%20v2.pdf)
  - PINE64 USB adapter for eMMC module PCB in JPEG (https://files.pine64.org/doc/rock64/USB%20a dapter%20for%20eMMC%20module%20PCB.tar)

- 16GB Foresee eMMC Datasheet (https://files.pine64.org/doc/datasheet/pine64/E-00517%20FORE
  SEE_eMMC_NCEMAM8B-16G%20SPEC.pdf)
- 32GB/64GB/128GB SanDisk eMMC Datasheet (https://files.pine64.org/doc/datasheet/pine64/SDIN
  ADF4-16-128GB-H%20data%20sheet%20v1.13.pdf)

- SPI NOR Flash information:

  - WinBond 128Mb SPI Flash Datasheet (https://files.pine64.org/doc/datasheet/pine64/w25q128jv%
    20spi%20revc%2011162016.pdf)
  - GigaDevice 128Mb SPI Flash Datasheet (https://files.pine64.org/doc/datasheet/pine64/GD25Q128
    C-Rev2.5.pdf)

- **PINE A64, PINE A64+, PINE A64-LTS and SOPINE Related:**

  - 5MPixel CMOS Camera module information:

    - PINE64 YL-PINE64-4EC 5M Pixel CMOS Image Sensor Module (Description in Chinese) (https://
      files.pine64.org/doc/datasheet/pine64/YL-PINE64-4EC.pdf)
    - S5K4EC 5MP CMOS Image Sensor SoC Module Datasheet (https://files.pine64.org/doc/datashe
      et/pine64/S5K4EC%205M%208%205X8%205%20PLCC%20%20Data%20Sheet_V1.0.pdf)
    - S5K4EC 5MP CMOS Image Sensor SoC Chip Datasheet (https://files.pine64.org/doc/datasheet/
      pine64/S5K4ECGX_EVT1_DataSheet_R005_20100816.pdf)
    - S5K4EC 5MP CMOS Image Sensor Driver Source Code in C language (https://files.pine64.org/d
      oc/datasheet/pine64/s5k4ec.c)
    - Early version Camera module information:

      - Bonsen Kexin V118-A64-GC2145-HM5065 CMOS Image Sensor Module (https://files.pine64.
        org/doc/datasheet/pine64/D116-A64_Bonsen_cmos_camera.pdf)
      - HiMax 5MP CMOS Image Sensor SoC (https://files.pine64.org/doc/datasheet/pine64/HM506
        5-DS-V03.pdf)

  - LCD Touch Screen Panel information:

    - 7.0" 1200x600 TFT-LCD Panel Specification (https://files.pine64.org/doc/datasheet/pine64/FY0
      7024DI26A30-D_feiyang_LCD_panel.pdf)
    - Touch Panel Specification (https://files.pine64.org/doc/datasheet/pine64/HK70DR2459-PG-V01.
      pdf)
    - GOODiX GT911 5-Point Capacitive Touch Controller Datasheet (https://files.pine64.org/doc/dat
      asheet/pine64/GT911%20Capacitive%20Touch%20Controller%20Datasheet.pdf)

  - Lithium Battery information:

    - 8000mAH Lithium Battery Specification (https://files.pine64.org/doc/datasheet/pine64/907012
      0P%203.7V%208000MAH.pdf)

  - Ethernet PHY information:

    - Realtek RTL8211 10/100/1000M Ethernet Transceiver for PINE A64-LTS Board and SOPine
      Baseboard (https://files.pine64.org/doc/datasheet/pine64/rtl8211e(g)-vb(vl)-cg_datasheet_1.6.
      pdf)

  - Wifi/BT module information:

    - PINE A64 Wifi/BT Module Schematic (https://files.pine64.org/doc/Pine%20A64%20Schematic/A
      64-DB-WIFI-BT-REV%20B.pdf)
    - Realtek RTL8723BS WiFi with BT SDIO (https://files.pine64.org/doc/datasheet/pine64/RTL8723
      BS.pdf)

  - Enclosure information:

    - Playbox Enclosure 3D file (https://files.pine64.org/doc/datasheet/case/playbox_enclosure_201
      60426.stp)
    - ABS Enclosure 3D file (https://files.pine64.org/doc/datasheet/case/ABS_enclosure_20160426.s

tp)

- Outdoor Aluminum Cast Dust-proof IP67 Enclosure Drawing (https://files.pine64.org/doc/datas heet/case/pine64%20Die%20Cast%20casing-final.jpg)

- Connector information:

  - 2.0mm PH Type connector specification use in Lithium Battery (VBAT) port and RTC Battery port (https://files.pine64.org/doc/datasheet/pine64/ePH.pdf)
  - 0.5mm Pitch cover type FPC connector specification use in DSI port, TP port and CSI port (http s://files.pine64.org/doc/datasheet/pine64/0.5FPC%20Front%20Open%20Connector%20H=1.5. pdf)

- Remote control button mapping

  - Official Remote Control for the PINE A64 Button Mapping (https://files.pine64.org/doc/Pine%20 A64%20Schematic/remote-wit-logo.jpg)

Pine A64 POT

- PINE A64 Peripheral On Top (POT) and Related Devices
- WiFi Remote I2c Quick Start Guide

Other Resources

- Linux Sunxi Wiki page on PINE A64 (https://linux-sunxi.org/Pine64#Manufacturer_images)
- Collection of scripts to set up a minimal Xenial 14.04.3 / Debian 8 Jessie root filesystem Contributed By Uli Middelberg (https://github.com/umiddelb/z2d/tree/master/pine64)
- Linux Image created by Andre Przywara (https://github.com/apritzel/pine64)
- PINE A64 with HypriotOS by Dieter and Govinda (https://blog.hypriot.com/post/the-pine-a64-is-about -to-become=the-cheapest-ARM-64-bit-platform-to-run-Docker/)
- H2testw 1.4 – Gold Standard In Detecting USB Counterfeit Drives (https://sosfakeflash.wordpress.co m/2008/09/02/h2testw-14-gold-standard-in-detecting-usb-counterfeit-drives/comment-page-3/#com ment-9861)
- F3 - an alternative to h2testw (https://oss.digirati.com.br/f3/)
- Benchmarking The Low-Cost PINE 64+ ARM Single Board Computer by Michael Larabel (https://www. phoronix.com/scan.php?page=article&item=pine-64-benchmark&num=1)
- PINE64 Linux build scripts, tools and instructions by Longsleep (https://github.com/longsleep/build-pi ne64-image)
- PINE64 Linux image by Longsleep (https://www.stdin.xyz/downloads/people/longsleep/pine64-image s/)
- A series of Youtube video on PINE A64 Developers Board by Michael Larson (https://www.youtube.co m/playlist?list=PLgj96wTPcMKffRm_Sk6673Nfy_I6b5UJW)
- PINE64 Quick Start Guide (with Gotchas) (https://rayhightower.com/blog/2016/04/04/pine64-quick-st art-guide-using-mac-os-x/)
- Shrinking images on Linux by FrozenCow (https://softwarebakery.com/shrinking-images-on-linux)
- Manjaro Arm installation script (https://gitlab.manjaro.org/packages/community/manjaro-arm-install er)

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