

[cubieboard\\_schematic\\_2012-08-08.pdf](#)

[BreadBoard V1.0 03-25 For CubieBoard.pdf](#)

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Contents: [Dobrica Pavlinu's random unstructured stuff]

- [Dobrica Pavlinu's random unstructured stuff \(A20\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(Running UBI/UBIFS on MLC NAND\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(NAND in mainline kernel\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(many bad blocks\)](#)
    - ◇ [Dobrica Pavlinu's random unstructured stuff \(cubieboard\)](#)
    - ◇ [Dobrica Pavlinu's random unstructured stuff \(cubieboard2\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(mount ubifs filesystem\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(u-boot\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(compile with nand support\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(pinout\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(U14 \(Next to SATA connector\)\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(U15 \(Between Ethernet port and USB ports\)\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(disk speed\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(NAND\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(SATA\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(GPIO\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(Camera\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(hardware\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(LEDs\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(forum\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(ina219\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(device tree\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(user-land C\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(SPI flash\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(flashrom\)](#)
  - ◆ [Dobrica Pavlinu's random unstructured stuff \(build u-boot with SPI support\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(reset\)](#)
- [Dobrica Pavlinu's random unstructured stuff \(external ir receiver\)](#)

## A20

- Debian image sunxi\_ss crypto <http://www.cubieforums.com/index.php/topic.1275.0.html>
- <http://www.armbian.com/cubieboard-2/>

## Running UBI/UBIFS on MLC NAND

- <https://events.static.linuxfound.org/sites/events/files/slides/ubi-mlc.pdf>
- <https://youtu.be/9j2pOliJqYw>

# NAND in mainline kernel

- [http://linux-sunxi.org/Mainline\\_NAND\\_Howto](http://linux-sunxi.org/Mainline_NAND_Howto)
- [http://linux-sunxi.org/MTD\\_Driver](http://linux-sunxi.org/MTD_Driver)

## Samsung K9GBG08U0A NAND

- <https://groups.google.com/forum/#!topic/linux-sunxi/PxMmiCe0Deg>
- <https://www.netdevconf.org/2.1/papers/distributed-switch-architecture.pdf>

```
dpavlin@cubieboard:~$ dmesg | grep -A 5 nand
[ 4.395437] nand: Could not find valid JEDEC parameter page; aborting
[ 4.401898] nand: device found, Manufacturer ID: 0xec, Chip ID: 0xd7
[ 4.408272] nand: Samsung NAND 4GiB 3,3V 8-bit
[ 4.412719] nand: 4096 MiB, MLC, erase size: 1024 KiB, page size: 8192, OOB size: 640
[ 4.421299] Bad block table found at page 524160, version 0x25
[ 4.427987] Bad block table found at page 524032, version 0x25
[ 4.434238] nand_read_bbt: bad block at 0x0000001000000
[ 4.439379] nand_read_bbt: bad block at 0x0000001100000
[ 4.445411] 6 ofpart partitions found on MTD device 1c03000.nand
[ 4.451420] Creating 6 MTD partitions on "1c03000.nand":
[ 4.456769] 0x000000a00000-0x0001ffa00000 : "rootfs"
[ 4.461737] mtd: partition "rootfs" extends beyond the end of device "1c03000.nand" -- size tr
[ 4.472910] 0x000001000000-0x000001400000 : "env"
[ 4.477926] 0x000000c00000-0x000001000000 : "U-Boot.backup"
[ 4.483748] 0x000000800000-0x000000c00000 : "U-Boot"
[ 4.488997] 0x000000400000-0x000000800000 : "SPL.backup"
[ 4.494580] 0x000000000000-0x000000400000 : "SPL"
```

```
dpavlin@cubieboard2:~$ dmesg | grep -A 5 nand
[ 4.709427] nand: device found, Manufacturer ID: 0xad, Chip ID: 0xd7
[ 4.715876] nand: Hynix H27UBG8T2BTR-BC 32G 3.3V 8-bit
[ 4.721021] nand: 4096 MiB, MLC, erase size: 2048 KiB, page size: 8192, OOB size: 640
[ 4.728997] Scanning device for bad blocks
[ 8.484659] 6 ofpart partitions found on MTD device 1c03000.nand
[ 8.490678] Creating 6 MTD partitions on "1c03000.nand":
[ 8.496021] 0x000000a00000-0x0001ffa00000 : "rootfs"
[ 8.500992] mtd: partition "rootfs" extends beyond the end of device "1c03000.nand" -- size tr
[ 8.515527] 0x000001000000-0x000001400000 : "env"
[ 8.520564] 0x000000c00000-0x000001000000 : "U-Boot.backup"
[ 8.526504] 0x000000800000-0x000000c00000 : "U-Boot"
[ 8.531755] 0x000000400000-0x000000800000 : "SPL.backup"
[ 8.537395] 0x000000000000-0x000000400000 : "SPL"
```

## many bad blocks

[http://linux-sunxi.org/Mainline\\_NAND\\_Howto#Many\\_bad\\_blocks](http://linux-sunxi.org/Mainline_NAND_Howto#Many_bad_blocks)

To fix many bad blocks issue you should:

1. Disable nand-on-flash-bbt in your dts
2. Remove this test:

[http://lxr.free-electrons.com/source/drivers/mtd/nand/nand\\_base.c?v=4.7#L2940](http://lxr.free-electrons.com/source/drivers/mtd/nand/nand_base.c?v=4.7#L2940)

3. Boot your new kernel and erase chip with `flash_erase /dev/mtd[0-X]`
4. Re-introduce the bad block check removed in 2, re-enable nand-on-flash-bbt

and boot the new kernel

Let's try to do this with armbian.

## cubieboard

First, enable nand overlay

```
dpavlin@cubieboard:~$ cat /boot/armbianEnv.txt
overlays=nand
```

Then remove nand-om-flash-btt:

```
dpavlin@cubieboard:/$ cd /boot/dtb-`uname -r`/overlay
dpavlin@cubieboard:/boot/dtb-4.14.23-sunxi/overlay$
```

```
# backup original
```

```
root@cubieboard:/boot/dtb-4.14.23-sunxi/overlay# cp sun4i-a10-nand.dtbo sun4i-a10-nand.dtbo.orig
```

```
# remote nand-on-flash-bbt
```

```
root@cubieboard:/boot/dtb-4.14.23-sunxi/overlay# dtc -I dtb -O dts sun4i-a10-nand.dtbo | grep -v
```

```
root@cubieboard:/boot/dtb-4.14.23-sunxi/overlay# dtc -I dts -O dtb /tmp/nand.dts > sun4i-a10-nand
```

Compile armbian kernel with this patch applied

```
dpavlin@armbian:~/build$ cp ./patch/kernel/sunxi-dev/nand-disable-badbblock-check-for-migration.patch
./userpatches/kernel/sunxi-next/nand-disable-badbblock-check-for-migration.patch
```

Reboot and check that nand is available:

```
dpavlin@cubieboard:~$ dmesg | grep -A 8 MTD
[ 13.696198] 6 ofpart partitions found on MTD device 1c03000.nand
[ 13.702205] Creating 6 MTD partitions on "1c03000.nand":
[ 13.707550] 0x000000a00000-0x0001ffa00000 : "rootfs"
[ 13.712517] mtd: partition "rootfs" extends beyond the end of device "1c03000.nand" -- size tr
[ 13.723693] 0x000001000000-0x000001400000 : "env"
[ 13.728713] 0x000000c00000-0x000001000000 : "U-Boot.backup"
[ 13.734568] 0x000000800000-0x000000c00000 : "U-Boot"
[ 13.739778] 0x000000400000-0x000000800000 : "SPL.backup"
[ 13.745368] 0x000000000000-0x000000400000 : "SPL"
[ 13.751476] sun4i-mdio 1c0b080.mdio: 1c0b080.mdio supply phy not found, using dummy regulator
```

Now init nand:

```
root@cubieboard:~# mtd_debug info /dev/mtd0
mtd.type = MTD_MLCNANDFLASH
mtd.flags = MTD_CAP_NANDFLASH
mtd.size = 4284481536 (3G)
mtd.erasesize = 1048576 (1M)
mtd.writesize = 8192 (8K)
mtd.oobsize = 640
regions = 0
```

```
root@cubieboard2:~# mtd_debug info /dev/mtd0
mtd.type = MTD_MLCNANDFLASH
mtd.flags = MTD_CAP_NANDFLASH
mtd.size = 4284481536 (3G)
mtd.erasize = 2097152 (2M)
mtd.writesize = 8192 (8K)
mtd.oobsize = 640
regions = 0

root@cubieboard:/home/dpavlin# flash_erase /dev/mtd0 0 0
Erasing 1024 Kibyte @ 600000 -- 0 % complete libmtd: error!: MEMERASE64 ioctl failed for erasebl
error 5 (Input/output error)
flash_erase: error!: /dev/mtd0: MTD Erase failure
error 5 (Input/output error)
Erasing 1024 Kibyte @ 700000 -- 0 % complete libmtd: error!: MEMERASE64 ioctl failed for erasebl
error 5 (Input/output error)
flash_erase: error!: /dev/mtd0: MTD Erase failure
error 5 (Input/output error)
Erasing 1024 Kibyte @ ff500000 -- 100 % complete

root@cubieboard:/home/dpavlin# ubiformat /dev/mtd0
ubiformat: mtd0 (mlc-nand), size 4284481536 bytes (4.0 GiB), 4086 eraseblocks of 1048576 bytes (1
libscan: scanning eraseblock 4085 -- 100 % complete
ubiformat: 4084 eraseblocks are supposedly empty
ubiformat: warning!: 2 of 4086 eraseblocks contain non-UBI data
ubiformat: continue? (y/N) y
ubiformat: warning!: only 0 of 4086 eraseblocks have valid erase counter
ubiformat: erase counter 0 will be used for all eraseblocks
ubiformat: note, arbitrary erase counter value may be specified using -e option
ubiformat: continue? (y/N) y
ubiformat: use erase counter 0 for all eraseblocks
ubiformat: formatting eraseblock 6 -- 0 % complete libmtd: error!: MEMERASE64 ioctl failed for
error 5 (Input/output error)

ubiformat: error!: failed to erase eraseblock 6
error 5 (Input/output error)
ubiformat: mark it as bad? (y/N) y
ubiformat: marking block 6 bad
ubiformat: formatting eraseblock 7 -- 0 % complete libmtd: error!: MEMERASE64 ioctl failed for
error 5 (Input/output error)

ubiformat: error!: failed to erase eraseblock 7
error 5 (Input/output error)
ubiformat: mark it as bad? (y/N) y
ubiformat: marking block 7 bad
ubiformat: formatting eraseblock 4085 -- 100 % complete

ubiattach -p /dev/mtd0

ubimkvol /dev/ubi0 -s 2GiB -N root

mount /dev/ubi0_0 /mnt/ -t ubifs

root@cubieboard:~# mount /dev/ubi0_0 /mnt/ -t ubifs
[Wed Feb 28 17:49:38 2018] UBIFS error (pid: 4709): cannot open "/dev/ubi0:root", error -22
[Wed Feb 28 17:49:43 2018] UBIFS (ubi0:0): background thread "ubifs_bgt0_0" started, PID 4722
[Wed Feb 28 17:49:44 2018] UBIFS (ubi0:0): UBIFS: mounted UBI device 0, volume 0, name "root"
[Wed Feb 28 17:49:44 2018] UBIFS (ubi0:0): LEB size: 1032192 bytes (1008 KiB), min./max. I/O unit
[Wed Feb 28 17:49:44 2018] UBIFS (ubi0:0): FS size: 2137669632 bytes (2038 MiB, 2071 LEBs), journ
[Wed Feb 28 17:49:44 2018] UBIFS (ubi0:0): reserved for root: 4952683 bytes (4836 KiB)
```

[Wed Feb 28 17:49:44 2018] UBIFS (ubi0:0): media format: w5/r0 (latest is w5/r0), UUID 8E9A30F0-2

## cubieboard2

This is mostly redundant from cubieboard, but with attempt to define mtd partitions correctly

```
root@cubieboard2:/home/dpavlin# ubiformat /dev/mtd0
ubiformat: mtd0 (mlc-nand), size 4273995776 bytes (4.0 GiB), 2038 eraseblocks of 2097152 bytes (2
libscan: scanning eraseblock 2037 -- 100 % complete
ubiformat: 2038 eraseblocks have valid erase counter, mean value is 1
ubiformat: formatting eraseblock 2037 -- 100 % complete
```

## mount ubifs filesystem

```
dpavlin@cubieboard:~$ grep ubi /mnt/boot/armbianEnv.txt
rootdev=ubi0:root ubi.mtd=0
rootfstype=ubifs
```

```
dpavlin@cubieboard:~$ grep ubi /etc/fstab
ubi0:root / ubifs defaults,noatime,nodiratime 0 1
```

## u-boot

### Original u-boot output

```
HELLO! BOOT0 is starting!
boot0 version : 1.5.1
dram size =1024
Succeed in opening nand flash.
Succeed in reading Boot1 file head.
The size of Boot1 is 0x0003c000.
The file stored in 0X00000000 of block 2 is perfect.
Check is correct.
Ready to disable icache.
Succeed in loading Boot1.
Jump to Boot1.
[ 0.133] boot1 version : 1.4.0
[ 0.133] pmu type = 3
[ 0.134] bat vol = 0
[ 0.161] axi:ahb:apb=3:2:2
[ 0.161] set dcdc2=1400, clock=1008 succeeded
[ 0.163] key
[ 0.175] no key found
[ 0.175] flash init start
[ 4.051] flash init finish
[ 4.052] fs init ok
[ 4.053] fattype FAT16
[ 4.053] fs mount ok
[ 4.060] script finish
[ 4.061] power finish
[ 4.069] BootMain start
```

```
[ 4.069] 13
[ 4.089] key value = 0
[ 4.089] recovery key high 6, low 4
[ 4.090] unable to find fastboot_key key_max value
[ 4.098] test for multi os boot with display
[ 4.100] show pic finish
[ 4.103] load kernel start
[ 4.127] load kernel succeeded
[ 4.127] start address = 0x4a00000
```

U-Boot 2011.09-rc1 (Nov 26 2012 - 14:01:52) Allwinner Technology

```
CPU: SUNXI Family
Board: A10-EVB
DRAM: 512 MiB
NAND: 3776 MiB
In: serial
Out: serial
Err: serial
```

```
-----fastboot partitions-----
-total partitions:11-
-name- -start- -size-
bootloader : 1000000 1000000
env : 2000000 1000000
boot : 3000000 2000000
system : 5000000 14000000
data : 19000000 20000000
misc : 39000000 1000000
recovery : 3a000000 2000000
cache : 3c000000 8000000
private : 44000000 1000000
sysrecovery : 45000000 14000000
UDISK : 59000000 93000000
-----
```

```
Hit any key to stop autoboot: 0
sunxi#
```

## compile with nand support

- <https://groups.google.com/forum/#!topic/linux-sunxi/PxMmiCe0Deg>

On Cubieboard2 with those patches we get:

```
=> nand info
```

```
Device 0: nand0, sector size 2048 KiB
Page size      8192 b
OOB size       640 b
Erase size     2097152 b
subpagesize    8192 b
options        0x00001000
bbt options    0x00070000
```

```
# which comparted to booted linux kernel with mtd support....
```

```
root@cubieboard2:~# mtd_debug info /dev/mtd0
mtd.type = MTD_MLCNANDFLASH
mtd.flags = MTD_CAP_NANDFLASH
mtd.size = 4284481536 (3G)
mtd.erasessize = 2097152 (2M)
mtd.writesize = 8192 (8K)
mtd.oobsize = 640
```

```
regions = 0
```

```
# it looks somewhat OK, but mtdparts doesn't (yet) return anything.
```

## Another day, another try to get mtdparts to display something...

```
root@armbian:~/build/cache/sources/u-boot/v2017.11# grep -i mtd .config
```

```
CONFIG_SPL_MTD_SUPPORT=y
```

```
CONFIG_CMD_MTDPARTS=y
```

```
CONFIG_MTDIDS_DEFAULT="nand0=sunxi-nand"
```

```
CONFIG_MTDPARTS_DEFAULT="mtdparts=sunxi-nand:4m(spl),4m(spl-backup),4m(uboot),4m(uboot-backup),4m(env),-(UBI)"
```

```
# CONFIG_CMD_MTDPARTS_SPREAD is not set
```

```
# MTD Support
```

```
CONFIG_MTD=y
```

```
# CONFIG_MTD_NOR_FLASH is not set
```

```
CONFIG_MTD_UBI=y
```

```
CONFIG_MTD_UBI_WL_THRESHOLD=4096
```

```
CONFIG_MTD_UBI_BEB_LIMIT=20
```

```
# CONFIG_MTD_UBI_FASTMAP is not set
```

```
=> mtdparts
```

```
device nand0 <sunxi-nand>, # parts = 6
```

#:	name	size	offset	mask_flags
0:	spl	0x00400000	0x00000000	0
1:	spl-backup	0x00400000	0x00400000	0
2:	uboot	0x00400000	0x00800000	0
3:	uboot-backup	0x00400000	0x00c00000	0
4:	env	0x00400000	0x01000000	0
5:	UBI	0xfec00000	0x01400000	0

```
active partition: nand0,0 - (spl) 0x00400000 @ 0x00000000
```

```
defaults:
```

```
mtdids : nand0=sunxi-nand
```

```
mtdparts: mtdparts=sunxi-nand:4m(spl),4m(spl-backup),4m(uboot),4m(uboot-backup),4m(env),-(UBI)
```

## Instructions after this are hit-or-miss...

```
dpavlin@klin:/klin/u-boot$ cp configs/Cubieboard_defconfig .config
```

```
# add NAND, MTD options, A10 for cubieboard1
```

```
# compile while defining flash:
```

```
dpavlin@klin:/klin/u-boot$ cat build-cubieboard.sh
```

```
# parametars are probably wrong for your chip!
```

```
make V=1 CONFIG_NAND_SUNXI_SPL_ECC_STRENGTH=40 CONFIG_SYS_NAND_PAGE_SIZE=4036 CONFIG_SYS_NAND_OOB
```

```
dpavlin@cubieboard:~$ scp 10.60.0.92:/klin/u-boot/u-boot*spl* .
```

```
dpavlin@cubieboard:~$ sudo dd if=u-boot-sunxi-with-spl.bin of=/dev/mmcblk0 bs=1024 seek=8  
488+1 records in
```

488+1 records out  
 500154 bytes (500 kB) copied, 0.0423498 s, 11.8 MB/s

It would be better to define params in u-boot config file like:

```
CONFIG_SYS_EXTRA_OPTIONS="SYS_NAND_BLOCK_SIZE=0x40000,SYS_NAND_PAGE_SIZE=4096,SYS_NAND_OOBSIZE=25"
```

(with correct values of course).

## pinout

- [http://docs.cubieboard.org/cubieboard1\\_and\\_cubieboard2\\_gpio\\_pin](http://docs.cubieboard.org/cubieboard1_and_cubieboard2_gpio_pin)

### U14 (Next to SATA connector)

t=0x818c088 cell=0x10200000[0,1]	cell=(nil) [0,2]
<b>SPI0</b>	
48 PI13 (SPI0-MISO/UART6-RX/EINT25)	47 PI11 (SPI0-CLK/UART5-RX/EINT23)
46 PI12 (SPI0-MOSI/UART6-TX/EINT24)	45 PI10 (SPI0-CS/UART5-TX/EINT22)
cell=0x10200000[3,1]	cell=(nil) [3,2]
<b>LCD</b>	
44 3.3V (nc in 2012-08-08)	43 VCC-5V
42 Ground	41 SPDIF
40 PB10 (LCD0-SCK/LCD-PIO1)	39 PB11 (LCD0-SDA/LCD-PIO2)
38 Ground	37 PH7 (LCD0-BL-EN/LCD-PIO0/UART5-RX/EINT7)
36 XN_TP (TP-X2)	35 YN_TP (TP-Y2)
34 XP_TP (TP-X1)	33 YP_TP (TP-Y1)
32 PD25 (LCDDE)	31 PB2 (PWM0)
30 PD26 (LCDHSYNC)-VGA-HSYNC	29 PD24 (LCDCLK)
28 PD23 (LCDD23)	27 PD27 (LCDVSYNC)-VGA-VSYNC
26 PD21 (LCDD21)	25 PD22 (LCDD22)
24 PD19 (LCDD19/LVDS1N3)	23 PD20 (LCDD20)
22 PD17 (LCDD17/LVDS1NC)	21 PD18 (LCDD18/LVDS1P3)
20 Ground	19 PD16 (LCDD16/LVDS1PC)
18 PD14 (LCDD14/LVDS1P2)	17 PD15 (LCDD15/LVDS1N2)
16 PD12 (LCDD12/LVDS1P1)	15 PD13 (LCDD13/LVDS1N1)
14 PD10 (LCDD10/LVDS1P0)	13 PD11 (LCDD11/LVDS1N0)
12 PD8 (LCDD8/LVDS0P3)	11 PD9 (LCDD9/LVDS0N3)
10 PD7 (LCDD7/LVDS0NC)	9 Ground
8 PD5 (LCDD5/LVDS0N2)	7 PD6 (LCDD6/LVDS0PC)



6	PD3 (LCDD3/LVDS0N1)	5	PD4 (LCDD4/LNVS0P2)
4	PD1 (LCDD1/LVDS0N0)	3	PD2 (LCDD2/LVDS0P1)
2	Ground	1	PD0 (LCDD0/LVDSP0)

## U15 (Between Ethernet port and USB ports)

t=0x8194078		cell=(nil) [0,2]	
<b>CSI1/TS</b>			
1	VCC-5V	2	PH15 (CSI1-PWR/EINT15)
3	CSI1-IO-2V8	4	PH14 (CSI1-RST#/EINT14)
5	PG0 (CSI1-PCLK/SDC1-CMD)	6	PB18 (TWI1-SCK)
7	PB19 (TWI1-SDA)	8	PG3 (CSI1-VSYNC/SDC1-D1)
9	PG2 (CSI1-HSYNC/SDC1-D0)	10	PG1 (CSI1-MCLK/SDC1-CLK)
11	PG4 (CSI1-D0/SDC1-D2)	12	PG5 (CSI1-D1/SDC1-D3)
13	PG6 (CSI1-D2/UART3-TX)	14	PG7 (CSI1-D3/UART3-RX)
15	PG8 (CSI1-D4/UART3-RTS)	16	PG9 (CSI1-D5/UART3-CTS)
17	PG10 (CSI1-D6/UART4-TX)	18	PG11 (CSI1-D7/UART4-RX)
19	Ground	20	Ground
<b>Analog SDIO3</b>		cell=(nil) [11,2]	
21	FMINL	22	PI4 (SDC3-CMD)
23	FMINR	24	PI5 (SDC3-CLK)
25	Ground	26	PI6 (SDC3-D0)
27	VGA-R	28	PI7 (SDC3-D1)
29	VGA-G	30	PI8 (SDC3-D2)
31	VGA-B	32	PI9 (SDC3-D3)
<b>CSI0/TS</b>		cell=(nil) [18,2]	
33	LCD1-VSYNC	34	PE4 (CSI0-D0)
35	LCD1-HSYNC	36	PE5 (CSI0-D1)
37	Ground	38	PE6 (CSI0-D2)
39	AVCC	40	PE7 (CSI0-D3)
41	LRADC0	42	PE8 (CSI0-D4)
43	CVBS	44	PE9 (CSI0-D5)
45	HPL	46	PE10 (CSI0-D6)
47	HPR	48	PE11 (CSI0-D7)

---

everything below line is for legacy kernel and quite old

# disk speed

## NAND

```
root@cubieboard2:/home/dpavlin# uname -a
Linux cubieboard2 3.4.109-sun7i #4 SMP PREEMPT Sun Oct 11 14:32:15 CEST 2015 armv7l GNU/Linux
root@cubieboard2:/home/dpavlin# hdparm -t /dev/nand
```

```
/dev/nand:
Timing buffered disk reads: 32 MB in 3.22 seconds = 9.94 MB/sec
```

```
# this is different, faster sdcard
```

```
root@cubieboard2:~# uname -a
Linux cubieboard2 4.3.3-sunxi #3 SMP Mon Dec 28 11:27:16 CET 2015 armv7l GNU/Linux
root@cubieboard2:~# hdparm -tT /dev/mmcblk0
```

```
/dev/mmcblk0:
Timing cached reads: 770 MB in 2.00 seconds = 384.59 MB/sec
Timing buffered disk reads: 60 MB in 3.05 seconds = 19.67 MB/sec
```

## SATA

Powered by 2A Nexus 7 power supply (for SATA)

<https://groups.google.com/d/searchin/cubieboard/sata/cubieboard/hKJgJneGVmQ/xme3w4Y7XtsJ?fromplus>

```
root@debian:~/sunxi-tools# ./bin2fex /boot/script.bin script.fex
fexc-bin: /boot/script.bin: version: 0.1.2
fexc-bin: /boot/script.bin: size: 42144 (76 sections)
```

```
root@debian:~/sunxi-tools# cp script.fex script+sata.fex
```

```
root@debian:~/sunxi-tools# diff -urw script.fex script+sata.fex
--- script.fex 2013-05-30 10:41:13.979510762 +0000
+++ script+sata.fex 2013-05-30 10:42:36.380244101 +0000
@@ -595,7 +595,7 @@
```

```
[sata_para]
sata_used = 1
-sata_power_en =
+sata_power_en = port:PB08<1><default><default><0>
```

```
[mmc0_para]
sdc_used = 1
```

```
root@debian:~/sunxi-tools# ./fex2bin script+sata.fex /boot/script.bin
```

```
root@debian:/etc# git diff
diff --git a/modules b/modules
index d8894c3..9e65a80 100644
--- a/modules
+++ b/modules
@@ -4,3 +4,4 @@
# at boot time, one per line. Lines beginning with "#" are ignored.
# Parameters can be specified after the module name.
```

```
+sw_ahci_platform
```

## Reboot to activate changes and test speed (using 80G intel SSD to have sense of maximum performance)

```
root@debian:~# hdparm -i /dev/sda
```

```
/dev/sda:
```

```
Model=INTEL SSDSA2M080G2GC, FwRev=2CV102HD, SerialNo=CVPO035101VN080JGN
Config={ Fixed }
RawCHS=16383/16/63, TrkSize=0, SectSize=0, ECCbytes=0
BuffType=unknown, BuffSize=unknown, MaxMultSect=16, MultSect=1
CurCHS=16383/16/63, CurSects=16514064, LBA=yes, LBAsects=156301488
IORDY=on/off, tPIO={min:120,w/IORDY:120}, tDMA={min:120,rec:120}
PIO modes:  pio0 pio3 pio4
DMA modes:  mdma0 mdma1 mdma2
UDMA modes: udma0 udma1 udma2 udma3 udma4 udma5 *udma6
AdvancedPM=no WriteCache=enabled
Drive conforms to: ATA/ATAPI-7 T13 1532D revision 1:  ATA/ATAPI-2,3,4,5,6,7
```

\* signifies the current active mode

```
root@debian:~# hdparm -tT /dev/sda
```

```
/dev/sda:
```

```
Timing cached reads:   784 MB in  2.00 seconds = 392.08 MB/sec
Timing buffered disk reads: 460 MB in  3.00 seconds = 153.32 MB/sec
```

## And test with disk:

```
root@debian:~# hdparm -i /dev/sda
```

```
/dev/sda:
```

```
Model=ST96812AS, FwRev=7.24, SerialNo=3PJ1GCKE
Config={ HardSect NotMFM HdSw>15uSec Fixed DTR>10Mbs RotSpdTol>.5% }
RawCHS=16383/16/63, TrkSize=0, SectSize=0, ECCbytes=4
BuffType=unknown, BuffSize=8192kB, MaxMultSect=16, MultSect=off
CurCHS=16383/16/63, CurSects=16514064, LBA=yes, LBAsects=117231408
IORDY=on/off, tPIO={min:240,w/IORDY:120}, tDMA={min:120,rec:120}
PIO modes:  pio0 pio1 pio2 pio3 pio4
DMA modes:  mdma0 mdma1 mdma2
UDMA modes: udma0 udma1 udma2 udma3 udma4 *udma5
AdvancedPM=yes: unknown setting WriteCache=enabled
Drive conforms to: Unspecified:  ATA/ATAPI-1,2,3,4,5,6,7
```

\* signifies the current active mode

```
root@debian:~# hdparm -tT /dev/sda
```

```
/dev/sda:
```

```
Timing cached reads:   746 MB in  2.00 seconds = 372.90 MB/sec
Timing buffered disk reads: 120 MB in  3.03 seconds = 39.56 MB/sec
```

# GPIO

- <https://github.com/gootoomoon/WiringCB-python>

# Camera

OV7670 is supported <http://linux-sunxi.org/CSI>

- [https://groups.google.com/forum/#!msg/linux-sunxi/DYWwfUFgVlw/\\_7A5APHyI7UJ](https://groups.google.com/forum/#!msg/linux-sunxi/DYWwfUFgVlw/_7A5APHyI7UJ)
- [https://groups.google.com/forum/#!msg/cubieboard/SWzC9qvpVL8/9cjQ\\_CPHQzUJ](https://groups.google.com/forum/#!msg/cubieboard/SWzC9qvpVL8/9cjQ_CPHQzUJ)

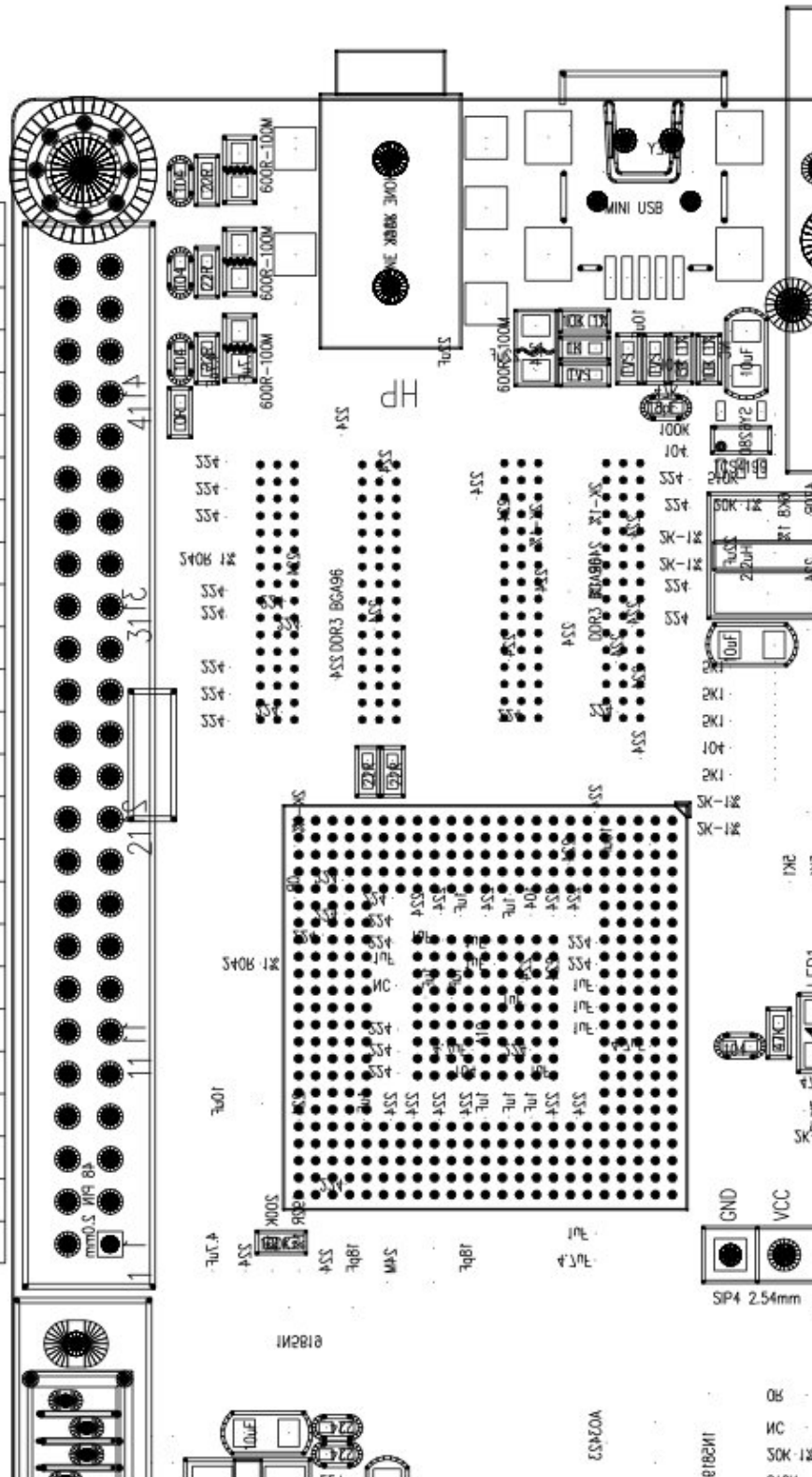
# hardware

- <http://linux-sunxi.org/Cubieboard/ExpansionPorts>
- <https://linux-sunxi.org/A20/PIO>

pinout:

# Cubian GPIO Pin

PIN	DEF	PIN	DEF
61	PI13	60	PI11
63	PI12	62	PI10
	3.3V		VCC-5V
	GND	64	PB13 (SPDIF)
66	PB10	65	PB11
	GND	67	PH7
	XN-TP		YN-TP
	XP-TP		YP-TP
53	PD25	52	PB2
55	PD26	54	PD24
57	PD23	56	PD27
59	PD21	58	PD22
45	PD19	44	PD20
47	PD17	46	PD18
	GND	48	PD16
50	PD14	49	PD15
36	PD12	51	PD13
38	PD10	37	PD11
40	PD8	39	PD9
41	PD7		GND
43	PD5	42	PD6
29	PD3	28	PD4
31	PD1	30	PD2
	GND	32	PD0



[https://www.olimex.com/wiki/How\\_to\\_add\\_pwm](https://www.olimex.com/wiki/How_to_add_pwm)

```
cat /sys/class/pwm-sunxi/pwm0/pin
PB2

echo 10khz > /sys/class/pwm-sunxi/pwm0/period

echo 25 > /sys/class/pwm-sunxi/pwm0/duty_percent

echo 1 > /sys/class/pwm-sunxi/pwm0/run
```

## LEDs

```
dpavlin@cubieboard2:~$ grep . /sys/class/leds/*/trigger
/sys/class/leds/blue:ph21:led2/trigger:none battery-charging-or-full battery-charging battery-full
/sys/class/leds/green:ph20:led1/trigger:[none] battery-charging-or-full battery-charging battery-full
```

## forum

- ov7670 <http://www.cubieforums.com/index.php/topic.3823.0.html>
- LVDS <http://www.cubieforums.com/index.php/topic.3908.0.html>

## ina219

### device tree

- <https://github.com/dpavlin/sunxi-DT-overlays/blob/cubieboard2/examples/i2c-ina219.dts>

```
dpavlin@cubieboard2:~$ sensors
ina219-i2c-1-40
Adapter: mv64xxx_i2c adapter
in0:          +0.04 V
in1:          +4.64 V
power1:       66.88 W
curr1:        +13.64 A

iio_hwmon-isa-0000
Adapter: ISA adapter
temp1:        +33.6i¿½C

root@cubieboard2:~# dmesg | grep ina | tail -1
[ 6597.685287] ina2xx 1-0040: power monitor ina219 (Rshunt = 100 uOhm)

# hum, it should be 10uA, so I changed that in device tree

dpavlin@cubieboard2:~$ dmesg | grep ina219
[ 11.594536] ina2xx 1-0040: power monitor ina219 (Rshunt = 10 uOhm)
dpavlin@cubieboard2:~$ sensors
ina219-i2c-1-40
Adapter: mv64xxx_i2c adapter
in0:          +0.02 V
in1:          +4.75 V
power1:       85.00 W
curr1:        +17.97 A
```

```
iio_hwmon-isa-0000
Adapter: ISA adapter
temp1:          +32.5iç¼C
```

```
# still wrong current!
```

## user-land C

User-land implementation which works:

<https://github.com/ZigFisher/Glutinium/blob/master/i2c-telemetry/src/ina219.c>

modified a little to provide full timestamp and fflush: [ina219.c](#)

```
dpavlin@cubieboard2:~$ ./ina219 -b 1 -i 1
2017-10-23T12:40:24 4744mV 262.2mA
2017-10-23T12:40:26 4756mV 249.1mA
2017-10-23T12:40:27 4776mV 223.0mA
2017-10-23T12:40:28 4772mV 223.8mA
2017-10-23T12:40:29 4760mV 224.0mA
2017-10-23T12:40:30 4768mV 223.0mA
2017-10-23T12:40:31 4772mV 223.1mA
2017-10-23T12:40:32 4748mV 224.6mA
2017-10-23T12:40:33 4776mV 223.1mA
2017-10-23T12:40:34 4768mV 223.5mA
```

## SPI flash

### flashrom

```
dpavlin@cubieboard:~$ sudo grep spidev /boot/armbianEnv.txt
overlays=pwm nand uart3 uart4 spi-spidev
#overlays=spi-spidev
param_spidev_spi_bus=0
```

```
dpavlin@cubieboard:~$ sudo flashrom -p linux_spi:dev=/dev/spidev0.0
flashrom v0.9.9-2-g51e4303 on Linux 4.14.47-sunxi (armv7l)
flashrom is free software, get the source code at https://flashrom.org
```

```
Calibrating delay loop... OK.
Found GigaDevice flash chip "GD25Q80(B)" (1024 kB, SPI) on linux_spi.
No operations were specified.
```

```
root@cubieboard:/home/dpavlin# time flashrom -p linux_spi:dev=/dev/spidev0.0 -r /dev/null
flashrom v0.9.9-2-g51e4303 on Linux 4.14.47-sunxi (armv7l)
flashrom is free software, get the source code at https://flashrom.org
```

```
Calibrating delay loop... OK.
Found GigaDevice flash chip "GD25Q80(B)" (1024 kB, SPI) on linux_spi.
Reading flash... done.
```

```
real    0m11.210s
user    0m0.796s
sys     0m0.381s
```

## build u-boot with SPI support

[http://linux-sunxi.org/Bootable\\_SPI\\_flash](http://linux-sunxi.org/Bootable_SPI_flash)

```
git clone -b sunxi-spi https://github.com/StephanvanSchaik/u-boot

dpavlin@armbian:~/u-boot$ git diff
diff --git a/configs/Cubieboard_defconfig b/configs/Cubieboard_defconfig
index 0389d4c..cbafac9 100644
--- a/configs/Cubieboard_defconfig
+++ b/configs/Cubieboard_defconfig
@@ -16,3 +16,13 @@ CONFIG_SPL=y
 # CONFIG_SPL_ISO_PARTITION is not set
 # CONFIG_SPL_EFI_PARTITION is not set
 CONFIG_USB_EHCI_HCD=y
+
+CONFIG_CMD_SF=y
+CONFIG_CMD_SPI=y
+CONFIG_DM_SPI_FLASH=y
+CONFIG_SPI_FLASH=y
+CONFIG_SPI_FLASH_MACRONIX=y
+CONFIG_SPI_FLASH_WINBOND=y
+CONFIG_DM_SPI=y
+CONFIG_SUNXI_SPI=y
+
dpavlin@armbian:~/u-boot$ make Cubieboard_defconfig
```

This doesn't actually work for me (since it's missing device tree overlays), but rebasing to current u-boot master doesn't produce code which compiles.

<https://forum.armbian.com/topic/3252-opi-zero-boot-with-spi/>

## reset

<http://linux-sunxi.org/Cubieboard/Reset>

## external ir receiver

configuration described on [lirc](#) page