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## MCU

Nuvoton M0517LBN ARM Cortex M0

Nuvoton donât guarantee the deviation of HIRC(22.1184MHz) for M0517.  
M0517 is a special part number of M051 series.

## Open source firmware

- <https://github.com/stawel/cheali-charger>
- <https://groups.google.com/forum/#!forum/cheali-charger>
- <http://www.rcgroups.com/forums/showthread.php?t=1951734>

## Flashing

<https://groups.google.com/forum/#!msg/cheali-charger/2Rz-dtwZ5ls/zUGr3PzX9bcJ>

pinout:

```
CHARGER -----DONGLE
ICE_DATA <-----> SWDIO
ICE_CLK <-----> SWCLK
ICE_RST <-----> RST (on SWIM header on my programmer)
GND <-----> GND
VCC <-----> 5V
```



```
dpavlin@x200:/rest/cvs/cheali-charger$ cat .gitmodules
[submodule "utils/M0517_flash_tools"]
    path = utils/M0517_flash_tools
    url = https://github.com/sasam/M0517_flash_tools.git
```

```
dpavlin@x200:/rest/cvs/cheali-charger/utils/M0517_flash_tools/tcl$ openocd \
-f /usr/share/openocd/scripts/interface/stlink-v2.cfg \
-f target_M0517_linux.cfg \
-f M0517_flash.tcl -f M0517_unlock.tcl
```

If you get following error:

```
Error: init mode failed (unable to connect to the target)
```

Connect RST pin to GND while plugging in ST-Link v2 into computer. This will start M0517 in reset mode (you might see squares in first line of display).

Then, unplug RST pin from GND and connect it to RST and restart openocd. Your IMAX B6 is probably protected, so follow instructions below to unlock it.

Open telnet connection to openocd in other terminal:

```
dpavlin@x200:/rest/cvs/cheali-charger$ telnet localhost 4444
Trying ::1...
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
Open On-Chip Debugger
> FlashAproom /rest/cvs/cheali-charger/hex/unstable/cheali-charger-imaxB6-clone_1.99-20150727_nuvo
```

Output from openocd after successful flash:

```
Open On-Chip Debugger 0.9.0 (2015-05-28-17:08)
Licensed under GNU GPL v2
For bug reports, read
    http://openocd.org/doc/doxygen/bugs.html
Info : The selected transport took over low-level target control.
      The results might differ compared to plain JTAG/SWD
adapter speed: 1000 kHz
adapter_nsrst_delay: 100
FlashAproom
EraseChip
```

```
Info : Unable to match requested speed 1000 kHz, using 950 kHz
Info : Unable to match requested speed 1000 kHz, using 950 kHz
Info : clock speed 950 kHz
Info : STLINK v2 JTAG v23 API v2 SWIM v4 VID 0x0483 PID 0x3748
Info : using stlink api v2
Info : Target voltage: 3.339130
Info : M0517.cpu: hardware has 4 breakpoints, 2 watchpoints
Info : accepting 'telnet' connection on tcp/4444
Image: /rest/cvs/cheali-charger/./src/hardware/nuvoton-M0517/targets/imaxB6-clone/cheali-charger-
>>>> Load FlashPgm to SRAM: NU_M051x.bin => 0x20000000
target state: halted
target halted due to debug-request, current mode: Thread
xPSR: 0xc1000000 pc: 0xffffffff msp: 0xffffffffc
276 bytes written at address 0x20000000
downloaded 276 bytes in 0.008215s (32.810 KiB/s)
>>>> FlashInit:
sp (/32): 0x20001000
pc (/32): 0x20000000
Error: timed out while waiting for target halted

Flash is locked!
Chip erase...
.
.
.
.
.
APROM: Erased!: (0x00000000):0xFFFFFFFF
LDROM: Erased!: (0x00100000):0xFFFFFFFF
Config: Erased!: (0x00300000):0xFFFFFFFF
Image: /rest/cvs/cheali-charger/./src/hardware/nuvoton-M0517/targets/imaxB6-clone/cheali-charger-
>>>> Load FlashPgm to SRAM: NU_M051x.bin => 0x20000000
target state: halted
target halted due to debug-request, current mode: Thread
xPSR: 0xc1000000 pc: 0xffffffff msp: 0xffffffffc
276 bytes written at address 0x20000000
downloaded 276 bytes in 0.008211s (32.826 KiB/s)
>>>> FlashInit:
sp (/32): 0x20001000
pc (/32): 0x20000000
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x41000000 pc: 0x20000048 msp: 0x20001000
r0 (/32): 0x00000000
>>>> FlashInit stop:
>>>> EreaseFlash: start
FLASH sector addr: 0x00000000
sectors to erease: 0x00000045
r0 (/32): 0x00000000
r1 (/32): 0x00000045
sp (/32): 0x20001000
pc (/32): 0x20000058
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x200000a2 msp: 0x20000fec
r0 (/32): 0x00000000
>>>> FlashErease: stop
>>>> FLASH image: /rest/cvs/cheali-charger/./src/hardware/nuvoton-M0517/targets/imaxB6-clone/ch
>> Flash Sector: 0-6 => 0x00000000 (3584)
SRAM load : tmp/fl.00 => 0x20000120
FLASH addr: reg r0 0x00000000
SIZE addr: reg r1 0x00000e00
BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.069231s (50.555 KiB/s)
r0 (/32): 0x00000000
```

```
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 7-13 => 0x00000e00 (3584)
    SRAM load : tmp/fl.01 => 0x20000120
    FLASH addr: reg r0 0x00000e00
    SIZE  addr: reg r1 0x00000e00
    BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.068563s (51.048 KiB/s)
r0 (/32): 0x00000E00
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 14-20 => 0x00001c00 (3584)
    SRAM load : tmp/fl.02 => 0x20000120
    FLASH addr: reg r0 0x00001c00
    SIZE  addr: reg r1 0x00000e00
    BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.068231s (51.296 KiB/s)
r0 (/32): 0x00001C00
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 21-27 => 0x00002a00 (3584)
    SRAM load : tmp/fl.03 => 0x20000120
    FLASH addr: reg r0 0x00002a00
    SIZE  addr: reg r1 0x00000e00
    BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.069227s (50.558 KiB/s)
r0 (/32): 0x00002A00
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 28-34 => 0x00003800 (3584)
    SRAM load : tmp/fl.04 => 0x20000120
    FLASH addr: reg r0 0x00003800
    SIZE  addr: reg r1 0x00000e00
    BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.069238s (50.550 KiB/s)
r0 (/32): 0x00003800
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
```

```
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 35-41 => 0x00004600 (3584)
    SRAM load : tmp/fl.05 => 0x20000120
    FLASH addr: reg r0 0x00004600
    SIZE  addr: reg r1 0x00000e00
    BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.069181s (50.592 KiB/s)
r0 (/32): 0x00004600
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 42-48 => 0x00005400 (3584)
    SRAM load : tmp/fl.06 => 0x20000120
    FLASH addr: reg r0 0x00005400
    SIZE  addr: reg r1 0x00000e00
    BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.069107s (50.646 KiB/s)
r0 (/32): 0x00005400
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 49-55 => 0x00006200 (3584)
    SRAM load : tmp/fl.07 => 0x20000120
    FLASH addr: reg r0 0x00006200
    SIZE  addr: reg r1 0x00000e00
    BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.069117s (50.639 KiB/s)
r0 (/32): 0x00006200
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 56-62 => 0x00007000 (3584)
    SRAM load : tmp/fl.08 => 0x20000120
    FLASH addr: reg r0 0x00007000
    SIZE  addr: reg r1 0x00000e00
    BUFFR addr: reg r2 0x20000120
3584 bytes written at address 0x20000120
downloaded 3584 bytes in 0.068143s (51.363 KiB/s)
r0 (/32): 0x00007000
r1 (/32): 0x00000E00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
```

```

target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>> Flash Sector: 63-68 => 0x00007e00 (2584)
    SRAM load : tmp/fl.09 => 0x20000120
    FLASH addr: reg r0 0x00007e00
    SIZE addr: reg r1 0x00000c00
    BUFFER addr: reg r2 0x20000120
2584 bytes written at address 0x20000120
downloaded 2584 bytes in 0.050122s (50.346 KiB/s)
r0 (/32): 0x00007E00
r1 (/32): 0x00000C00
r2 (/32): 0x20000120
sp (/32): 0x20001000
pc (/32): 0x200000AE
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
r0 (/32): 0x00000000
>>>> FLASH image: stop
>>>> Verify: verify_image /rest/cvs/cheali-charger/./src/hardware/nuvoton-M0517/targets/imaxB6
target state: halted
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000002e msp: 0x20000ff4
verified 34840 bytes in 0.226838s (149.990 KiB/s)
Trajanje init: 0 sec
Trajanje brisi: 2 sec
Trajanje pisi: 2 sec
Trajanje ukupno: 4 sec

```

## Update

```

dpavlin@x200:/rest/cvs/cheali-charger/utils/M0517_flash_tools/tcl$ openocd -f interface/stlink-v2
Open On-Chip Debugger 0.9.0 (2015-05-28-17:08)
Licensed under GNU GPL v2
For bug reports, read
    http://openocd.org/doc/doxygen/bugs.html
Info : The selected transport took over low-level target control. The results might differ compar
adapter speed: 1000 kHz
adapter_nsrst_delay: 100
Info : Unable to match requested speed 1000 kHz, using 950 kHz
Info : Unable to match requested speed 1000 kHz, using 950 kHz
Info : clock speed 950 kHz
Info : STLINK v2 JTAG v23 API v2 SWIM v4 VID 0x0483 PID 0x3748
Info : using stlink api v2
Info : Target voltage: 3.239563
Info : M0517.cpu: hardware has 4 breakpoints, 2 watchpoints

```

```
# in other terminal
```

```

dpavlin@x200:/rest/cvs/cheali-charger/utils/M0517_flash_tools$ telnet localhost 4444
Trying ::1...
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
Open On-Chip Debugger
> source M0517_flash.tcl
FlashAprom
> FlashAprom /rest/cvs/cheali-charger/hex/unstable/cheali-charger-imaxB6-clone_1.99-20150727_nuvo

```

# Serial port

- <http://www.rcgroups.com/forums/showthread.php?t=1046318>
- <https://groups.google.com/forum/#!topic/cheali-charger/VATJQ4-GpVE%5B1-25%5D>

1 2 3

- 1 - +5V
- 2 - TTL TX serial / Vout of LM35
- 3 - GND

## LogView

### tsv

```
grep '$1' cheali.log | sed 's/;/\t/g' | xclip -selection clipboard -i
```

## temperature sensor

cheali-charger version 1.99:

The "Hard way" (any temp probe):

1. connect external temp probe
2. check if there is 5V on temp. connector (between pin 1 (GND) and pin 3)
3. go to: "options" > ~~"calibrate"~~ > "temp extern"  
(first calibration point: point 0)
4. set "temp:" to your room temperature (~20°C)
- (second calibration point: point 1)
5. set "calib. p.:" to 1
6. heat temp. sensor to 60°C
7. set "temp:" to 60°C (the temperature sensor should be at 60°C at this moment)

The "easy way" (LM35, LM35DZ):

1. connect external temp probe
2. check if there is 5V on temp. connector (between pin 1 (GND) and pin 3)
2. check sensor output voltage, should be: ~0.20V (between pin 1 (GND) and pin 2)
3. go to: "options" > ~~"calibrate"~~ > "temp extern"  
(first calibration point: point 0)
4. set "temp:" to your room temperature (~20°C)
- (second calibration point: point 1)
5. set "calib. p.:" to 1
6. disconnect temperature probe
7. make a shortcut between pin 1 (GND) and pin 2 on the temperature connector (simulate sensor output voltage = 0V)
8. set "temp:" to 0°C

# backup calibration

## memory map

Table 6.13-1 Memory Address Map

Block Name	Size	Start Address	End Address
AP-ROM	8/16/32/64KB	0x0000_0000	0x0000_1FFF (8KB)
			0x0000_3FFF (16KB)
			0x0000_7FFF (32KB)
			0x0000_FFFF (64KB)
Data Flash	4KB	0x0001_F000	0x0001_FFFF
LD-ROM	4KB	0x0010_0000	0x0010_0FFF
User Configuration	1 Words	0x0030_0000	0x0030_0000

## backup

```
> init
> dump_image aprom.bin 0x0 0x10000
dumped 65536 bytes in 0.638086s (100.300 KiB/s)

> dump_image flash_data.bin 0x1f000 0x1000
dumped 4096 bytes in 0.042080s (95.057 KiB/s)

> dump_image ldrom.bin 0x100000 0x1000
SWD DPIDR 0x0bb11477
Failed to read memory at 0x00100000

> dump_image config.bin 0x300000 0x1000
SWD DPIDR 0x0bb11477
Failed to read memory at 0x00300000
```

## create calibration for compile from backup

apply fix for python3 from <https://github.com/dpavlin/cheali-charger/tree/python3>

```
dpavlin@nuc:/nuc/cheali-charger/utils/EEPROMExtractor$ ls -al EEPROMExtractor
-r--r--r-- 1 dpavlin dpavlin 4096 Jul  5 10:54 EEPROMExtractor
dpavlin@nuc:/nuc/cheali-charger/utils/EEPROMExtractor$ ./EEPROMExtractor.py
magic: chli
version: 9.3.10
Data(
  magicString = (
    99,
    104,
    108,
    105,
  ),
  architecture = 16385,
  calibrationVersion = 9,
  programDataVersion = 3,
```



```

settingVersion = 10,
calibration = (
  Calibration(
    p = (
      CalibrationPoint(
        x = 0,
        y = 50,
      ),
      CalibrationPoint(
        x = 17148,
        y = 15976,
      ),
    ),
  ),
  Calibration(
    p = (
      CalibrationPoint(
        x = 0,
        y = 50,
      ),
      CalibrationPoint(
        x = 17148,
        y = 15976,
      ),
    ),
  ),
  Calibration(
    p = (
      CalibrationPoint(
        x = 525,
        y = 100,
      ),
      CalibrationPoint(
        x = 5447,
        y = 1000,
      ),
    ),
  ),
  Calibration(
    p = (
      CalibrationPoint(
        x = 1919,
        y = 100,
      ),
      CalibrationPoint(
        x = 5827,
        y = 300,
      ),
    ),
  ),
  Calibration(
    p = (
      CalibrationPoint(
        x = 0,
        y = 0,
      ),
      CalibrationPoint(
        x = 1,
        y = 1,
      ),
    ),
  ),
  Calibration(
    p = (
      CalibrationPoint(
        x = 8000,

```

```

        y = 5940,
    ),
    CalibrationPoint(
        x = 8642,
        y = 3479,
    ),
),
),
Calibration(
    p = (
        CalibrationPoint(
            x = 0,
            y = 0,
        ),
        CalibrationPoint(
            x = 21558,
            y = 12728,
        ),
    ),
),
),
Calibration(
    p = (
        CalibrationPoint(
            x = 52287,
            y = 1910,
        ),
        CalibrationPoint(
            x = 45432,
            y = 0,
        ),
    ),
),
),
Calibration(
    p = (
        CalibrationPoint(
            x = 0,
            y = 0,
        ),
        CalibrationPoint(
            x = 25736,
            y = 3995,
        ),
    ),
),
),
Calibration(
    p = (
        CalibrationPoint(
            x = 0,
            y = 0,
        ),
        CalibrationPoint(
            x = 25736,
            y = 3995,
        ),
    ),
),
),
Calibration(
    p = (
        CalibrationPoint(
            x = 0,
            y = 0,
        ),
        CalibrationPoint(
            x = 51320,
            y = 7985,
        ),
    ),
),

```

```

    ),
),
Calibration(
  p = (
    CalibrationPoint(
      x = 0,
      y = 0,
    ),
    CalibrationPoint(
      x = 26220,
      y = 4002,
    ),
  ),
),
),
Calibration(
  p = (
    CalibrationPoint(
      x = 0,
      y = 0,
    ),
    CalibrationPoint(
      x = 26150,
      y = 3989,
    ),
  ),
),
),
Calibration(
  p = (
    CalibrationPoint(
      x = 0,
      y = 0,
    ),
    CalibrationPoint(
      x = 25169,
      y = 3916,
    ),
  ),
),
),
Calibration(
  p = (
    CalibrationPoint(
      x = 0,
      y = 0,
    ),
    CalibrationPoint(
      x = 25405,
      y = 3933,
    ),
  ),
),
),
Calibration(
  p = (
    CalibrationPoint(
      x = 525,
      y = 100,
    ),
    CalibrationPoint(
      x = 5457,
      y = 1000,
    ),
  ),
),
),
Calibration(
  p = (
    CalibrationPoint(
      x = 3013,

```

```

        y = 100,
    ),
    CalibrationPoint(
        x = 9187,
        y = 300,
    ),
),
),
calibrationCRC = 53014,
battery = (
    Battery(
        type = 6,
        capacity = 2000,
        cells = 4,
        Ic = 1000,
        Id = 410,
        Vc_per_cell = 4200,
        Vd_per_cell = 3000,
        minIc = 100,
        minId = 55,
        time = 1000,
        enable_externT = 1,
        externTCO = 6000,
        enable_adaptiveDischarge = 0,
        DCRestTime = 30,
        capCutoff = 120,
        _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73640>,
    ),
    Battery(
        type = 6,
        capacity = 3000,
        cells = 1,
        Ic = 3000,
        Id = 1000,
        Vc_per_cell = 4200,
        Vd_per_cell = 3000,
        minIc = 300,
        minId = 100,
        time = 1000,
        enable_externT = 0,
        externTCO = 6000,
        enable_adaptiveDischarge = 0,
        DCRestTime = 30,
        capCutoff = 120,
        _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac735c0>,
    ),
    Battery(
        type = 1,
        capacity = 2000,
        cells = 1,
        Ic = 2000,
        Id = 490,
        Vc_per_cell = 1800,
        Vd_per_cell = 850,
        minIc = 200,
        minId = 100,
        time = 1000,
        enable_externT = 1,
        externTCO = 6000,
        enable_adaptiveDischarge = 0,
        DCRestTime = 30,
        capCutoff = 120,
        _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73740>,
    ),
    Battery(

```

```
    type = 2,
    capacity = 3600,
    cells = 2,
    Ic = 3600,
    Id = 1000,
    Vc_per_cell = 1800,
    Vd_per_cell = 1000,
    minIc = 360,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73640>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac735c0>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73740>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
```

```

    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73640>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac735c0>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73740>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73640>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,

```

```

    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac735c0>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73740>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73640>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac735c0>,
),
Battery(

```

```

    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73740>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73640>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,
    enable_adaptiveDischarge = 0,
    DCRestTime = 30,
    capCutoff = 120,
    _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac735c0>,
),
Battery(
    type = 0,
    capacity = 2000,
    cells = 3,
    Ic = 2000,
    Id = 1000,
    Vc_per_cell = 1,
    Vd_per_cell = 1,
    minIc = 200,
    minId = 100,
    time = 1000,
    enable_externT = 0,
    externTCO = 6000,

```



```

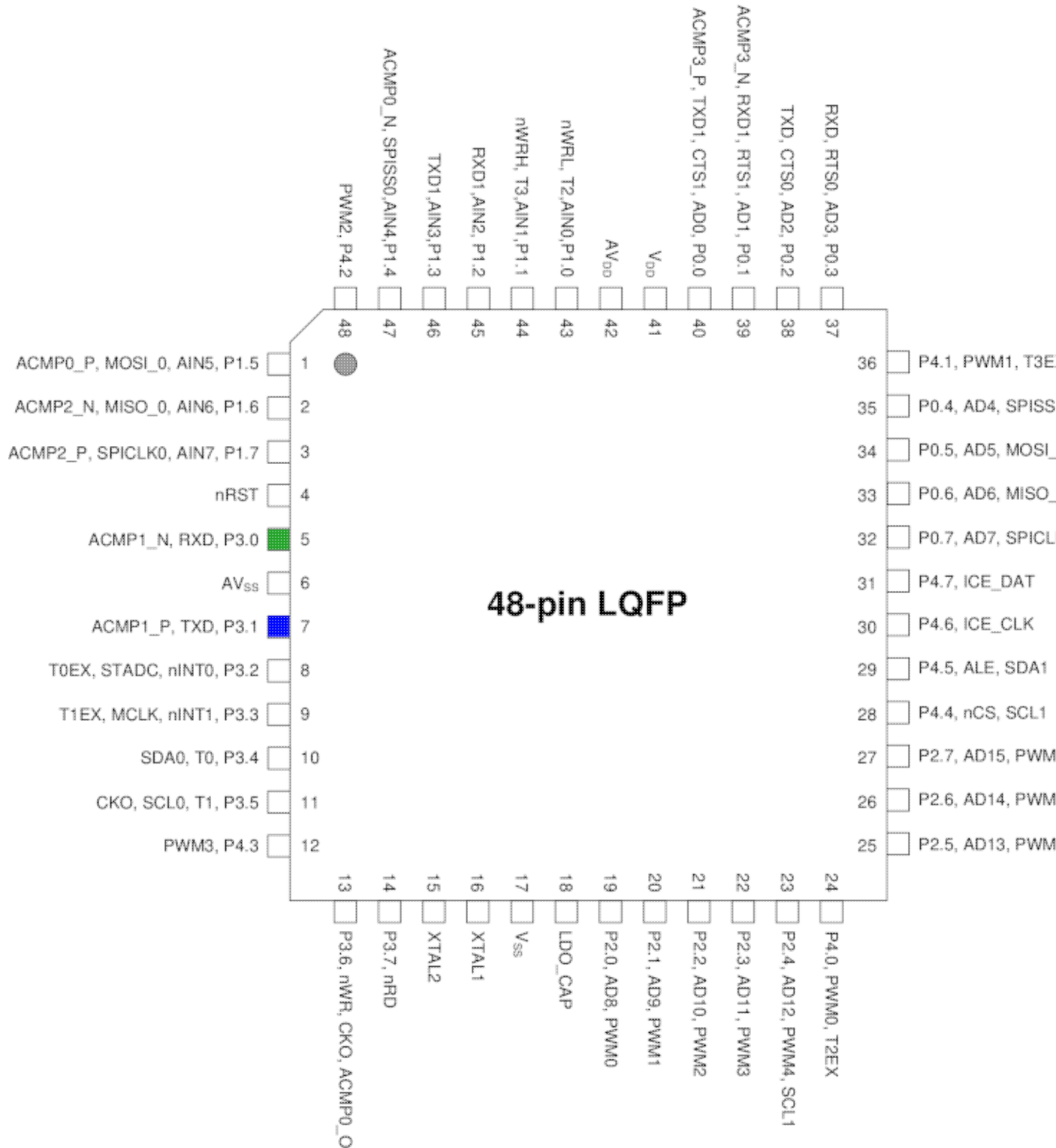
        enable_adaptiveDischarge = 0,
        DCRestTime = 30,
        capCutoff = 120,
        _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73740>,
    ),
    Battery(
        type = 0,
        capacity = 2000,
        cells = 3,
        Ic = 2000,
        Id = 1000,
        Vc_per_cell = 1,
        Vd_per_cell = 1,
        minIc = 200,
        minId = 100,
        time = 1000,
        enable_externT = 0,
        externTCO = 6000,
        enable_adaptiveDischarge = 0,
        DCRestTime = 30,
        capCutoff = 120,
        _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac73640>,
    ),
    Battery(
        type = 11,
        capacity = 2000,
        cells = 1,
        Ic = 2000,
        Id = 1000,
        Vc_per_cell = 3000,
        Vd_per_cell = 1,
        minIc = 200,
        minId = 100,
        time = 1000,
        enable_externT = 0,
        externTCO = 6000,
        enable_adaptiveDischarge = 0,
        DCRestTime = 30,
        capCutoff = 120,
        _0 = <v9_3_10.N11ProgramData7Battery3DOT_1E object at 0x7f3f4ac735c0>,
    ),
),
programDataCRC = 13555,
settings = Settings(
    backlight = 70,
    fanOn = 3,
    fanTempOn = 5000,
    dischargeTempOff = 6000,
    audioBeep = 1,
    minIc = 50,
    minId = 50,
    inputVoltageLow = 10000,
    adcNoise = 0,
    UART = 3,
    UARTspeed = 3,
    UARToutput = 1,
    menuType = 1,
),
settingsCRC = 15640,
)
dpavlin@nuc:/nuc/cheali-charger/utils/EEPROMExtractor$ cp defaultCalibration.cpp ../../src/hardwa

```

# serial tx and rx on chip pins

- pin 5 - P3.0 RX
- pin 7 - P3.1 TX

M051-LQFP-pins.png



# openocd upstream support for nuvoton

```
pi@pihdmi:~/openocd-rpi2-stm32/imax_b6 $ openocd -f rpi2-swd.cfg -f target/numicro.cfg
Open On-Chip Debugger 0.10.0+dev-01489-g06c7a53f1-dirty (2020-11-14-15:21)
Licensed under GNU GPL v2
For bug reports, read
    http://openocd.org/doc/doxygen/bugs.html

swd
cortex_m reset_config sysresetreq

Info : Listening on port 6666 for tcl connections
Info : Listening on port 4444 for telnet connections
Info : BCM2835 GPIO JTAG/SWD bitbang driver
Info : clock speed 1001 kHz
Info : SWD DPIDR 0x0bb11477
Info : NuMicro.cpu: hardware has 4 breakpoints, 2 watchpoints
Info : starting gdb server for NuMicro.cpu on 3333
Info : Listening on port 3333 for gdb connections
```

## Program new version

```
> halt
target halted due to debug-request, current mode: Handler External Interrupt(6)
xPSR: 0x41000016 pc: 0x00000a70 msp: 0x20000f60
> flash write_bank 0 /nuc/cheali-charger/src/hardware/nuvoton-M0517/targets/imaxB6-clone/cheali-c
Nuvoton NuMicro: Flash Write ...
wrote 37776 bytes from file /nuc/cheali-charger/src/hardware/nuvoton-M0517/targets/imaxB6-clone/c

> reset
NuMicro.cpu -- clearing lockup after double fault
target halted due to debug-request, current mode: Handler HardFault
xPSR: 0x01000003 pc: 0xffffffff msp: 0x20000eb0
Polling target NuMicro.cpu failed, trying to reexamine
NuMicro.cpu: hardware has 4 breakpoints, 2 watchpoints
```

This will brick mcu, so don't do it!

## openocd 0.10 changes

[https://github.com/dpavlin/M0517\\_flash\\_tools/tree/fix\\_openocd\\_0.10](https://github.com/dpavlin/M0517_flash_tools/tree/fix_openocd_0.10)

Update cheali-charger/utis/M0517\_flash\_tools to branch fix\_openocd\_0.10

## update version

start openocd with raspberry pi configurtaion:

```
pi@pihdmi:~/openocd-rpi2-stm32/imax_b6 $ openocd -f target_M0517_rpi.cfg -s /nuc/cheali-charger/u
Open On-Chip Debugger 0.10.0+dev-01489-g06c7a53f1-dirty (2020-11-14-15:21)
Licensed under GNU GPL v2
For bug reports, read
    http://openocd.org/doc/doxygen/bugs.html
cortex_m reset_config sysresetreq
```

```
FlashAprom
EraseChip
Info : Listening on port 6666 for tcl connections
Info : Listening on port 4444 for telnet connections
Info : BCM2835 GPIO JTAG/SWD bitbang driver
Info : clock speed 1001 kHz
Info : SWD DPIDR 0x0bb11477
Info : M0517.cpu: hardware has 4 breakpoints, 2 watchpoints
Info : starting gdb server for M0517.cpu on 3333
Info : Listening on port 3333 for gdb connections
Info : accepting 'telnet' connection on tcp/4444
```

## connect and flash latest version

```
pi@pihdmi:~/openocd-rpi2-stm32/imax_b6 $ telnet localhost 4444
```

```
Trying ::1...
```

```
Trying 127.0.0.1...
```

```
Connected to localhost.
```

```
Escape character is '^]'.
Open On-Chip Debugger
```

```
>
```

```
> FlashAprom /nuc/cheali-charger/src/hardware/nuvoton-M0517/targets/imaxB6-clone/cheali-charger-i
```

```
> FlashAprom /nuc/cheali-charger/src/hardware/nuvoton-M0517/targets/imaxB6-clone/cheali-charger-i
```

```
target halted due to debug-request, current mode: Thread
```

```
xPSR: 0xc1000000 pc: 0x00001000 msp: 0x20000ed0
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x41000000 pc: 0x20000048 msp: 0x20001000
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x200000a2 msp: 0x20000fec
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
target halted due to breakpoint, current mode: Thread
```

```
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

```
> reset
```

## output from openocd:

```
pi@pihdmi:~/openocd-rpi2-stm32/imax_b6 $ cat openocd.sh
```

```
openocd -s /nuc/cheali-charger/utils/M0517_flash_tools/tcl -f target_M0517_rpi.cfg -f M0517_flash
```

```
pi@pihdmi:~/openocd-rpi2-stm32/imax_b6 $ ./openocd.sh
```

Open On-Chip Debugger 0.10.0+dev-01489-g06c7a53f1-dirty (2020-11-14-15:21)  
Licensed under GNU GPL v2  
For bug reports, read  
<http://openocd.org/doc/doxygen/bugs.html>  
cortex\_m reset\_config sysresetreq

Flash

EraseChip

```
Info : Listening on port 6666 for tcl connections
Info : Listening on port 4444 for telnet connections
Info : BCM2835 GPIO JTAG/SWD bitbang driver
Info : clock speed 1001 kHz
Info : SWD DPIDR 0x0bb11477
Info : M0517.cpu: hardware has 4 breakpoints, 2 watchpoints
Info : starting gdb server for M0517.cpu on 3333
Info : Listening on port 3333 for gdb connections
Info : accepting 'telnet' connection on tcp/4444
Info : dropped 'telnet' connection
Info : accepting 'telnet' connection on tcp/4444
Image: /nuc/cheali-charger/src/hardware/nuvoton-M0517/targets/imaxB6-clone/cheali-charger-imaxB6-
>>>> Load FlashPgm to SRAM: NU_M051x.bin => 0x20000000
target halted due to debug-request, current mode: Thread
xPSR: 0xc1000000 pc: 0x00001144 msp: 0x20000fd8
>>>> FlashInit:
target halted due to breakpoint, current mode: Thread
xPSR: 0x41000000 pc: 0x20000048 msp: 0x20001000
>>>> FlashInit stop:
time init: 1 sec
>>>> EreleaseFlash: start
FLASH sector addr: 0x00000000
sectors to erease: 0x00000044
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x200000a2 msp: 0x20000fec
>>>> FlashErease: stop
time erease: 1 sec
>>>> FLASH image: /nuc/cheali-charger/src/hardware/nuvoton-M0517/targets/imaxB6-clone/cheali-ch
>> Flash Sector: 0-6 => 0x00000000 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 7-13 => 0x00000e00 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 14-20 => 0x00001c00 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 21-27 => 0x00002a00 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 28-34 => 0x00003800 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 35-41 => 0x00004600 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 42-48 => 0x00005400 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 49-55 => 0x00006200 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 56-62 => 0x00007000 (3584)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
>> Flash Sector: 63-67 => 0x00007e00 (2404)
target halted due to breakpoint, current mode: Thread
xPSR: 0x61000000 pc: 0x2000010c msp: 0x20000ff4
```

>>>> FLASH image: stop

>>>> Verify: verify\_image /nuc/cheali-charger/src/hardware/nuvoton-M0517/targets/imaxB6-clone/

time write: 1 sec

time summary: 3 sec