SMH Technologies®

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Driver v. 1.00

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Interfacing FlashRunner 2.0 with TC4xx

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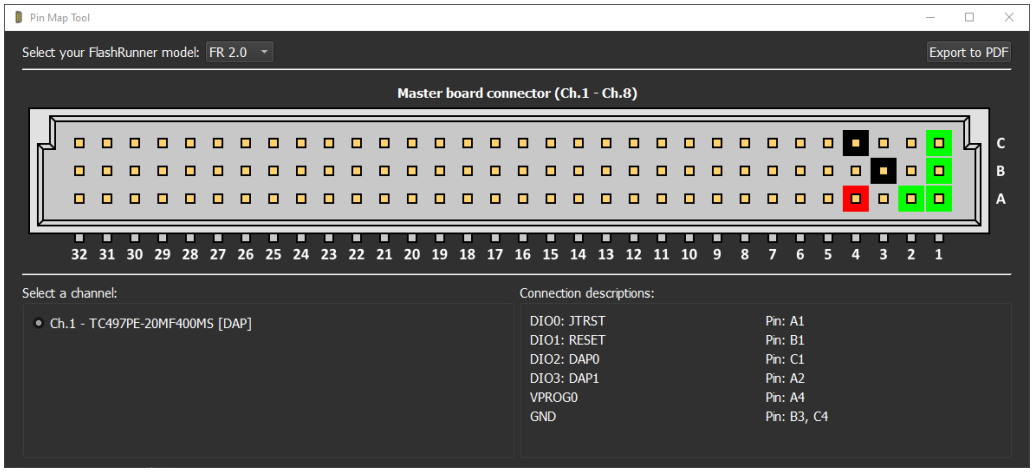
Supported protocols

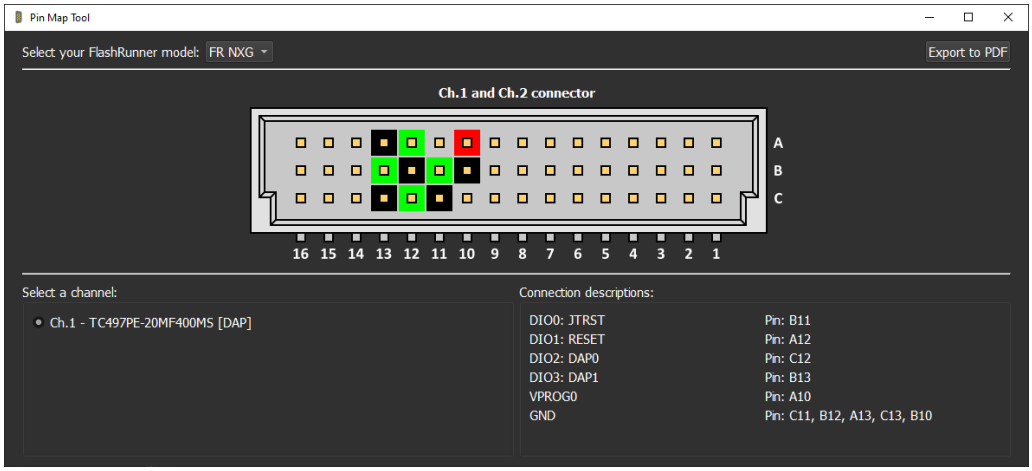
TC4xx flashing algorithm supports Infineon proprietary DAP protocol.

#TCSETPAR CMODE **<DAP>**

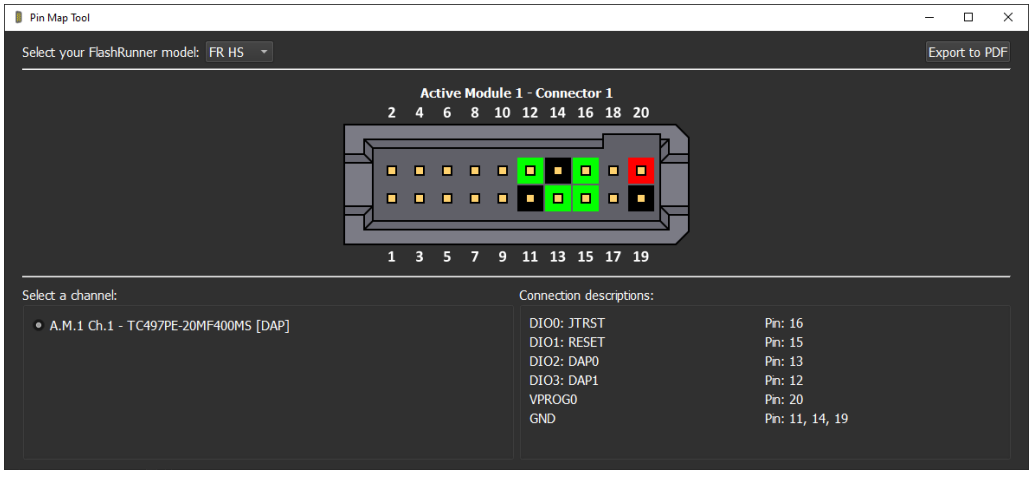
FlashRunner 2.0



FlashRunner 2.0 NXG



FlashRunner HS



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Length vs Frequency

Using 50cm twisted shielded pair cables from programming system to TC4xx MCU, separated from the rest of the cables that a flash/test machine/fixture would require, would allow the customer to exploit at best its performances and allowing to set the frequency up to 30MHz (best compromise between signals stability and integrity and cycle time).

Using 1m twisted shielded pair cables from programming system to TC4xx MCU, separated from the rest of the cables that a flash/test machine/fixture would require, would allow the customer to set the frequency up to 15MHz.

Using 2m twisted shielded pair cables from programming system to TC4xx MCU, separated from the rest of the cables that a flash/test machine/fixture would require, would allow the customer up to 5MHz.

Parallel configurations must be kept as protected as possible from crosstalk and external disturbances/interferences.

Standard Commands

CONNECT

This command is used to connect to the device. It prints out information on the status of the debug interface.
It unlocks the debug port automatically if it is locked and the right password is provided through FlashRunner dynamic memory or FRB.

MASSERASE <memory_type>

This command is used to erase the specified memory.

SECTOR_ERASE <memory_type> <start_address> <size>

This command is used to erase a portion of the specified memory.

BLANKCHECK <memory_type> [<start_address> <size>]

This command is used to check if the specified memory or a portion of it is blank.
Start address and size are optional parameters.

PROGRAM <memory_type>

This command is used to flash the specified memory with a customer's firmware which fits into this memory.

VERIFY <memory_type> <verify_method>

This command is used to compare the content of the memory with a customer's firmware.

R – Readout method: compares the content bit by bit.

S – Checksum method: compares the checksum of the source file with the checksum of the memory content.

READ <memory_type> <start_address> <size>

This command is used to read the specified memory or a portion of it and print it out in the GUI terminal.

DUMP <memory_type> <start_address> <size>

This command is used to read the specified memory or a portion of it and save it into a binary file stored inside the programming system SD-CARD.

DISCONNECT

This command is used to disconnect from the device.

Memories

1. [F] – Flash
2. [f] – Flash CS
3. [D] – DataFlash
4. [d] – DataFlash CS
5. [U] – UCB (no erase/blankcheck commands)
6. [u] – UCB CS (no erase/blankcheck commands)

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UCB programming for TC49xx/TC4Dxx

The two UCB areas are composed by multiple sectors of the same size (2KB): most of the TC4xx memories/debug protections/settings can be customized on these sectors.

In specific address offsets of every sector, one or more confirmation codes are stored; confirmation code stores the status of the sector:

1) UNLOCKED (delivery state)
2) LOCKED

These confirmation codes cannot be left in erased state, otherwise the device would not startup anymore and results in a bricked state. This is the reason why the algorithm does not implement a UCB/UCB CS ERASE/BLANKCHECK.

When data needs to be flashed inside these areas, the algorithm automatically understands the sector under process and proceed by deleting the content form it and by programming it right after with new data and so on with the other sectors.

If the algorithm does not detect valid confirmation code set by the user for the sector/sectors that need to be programmed, it will not proceed further and stop the flashing giving back an error.

If the customer attempts to program UCB holes or read-only memories, the algorithm will print out this information as warnings and proceed by checking and eventually program the rest of the data.

UCB_DBGCS_ORIG/UCB_DBGCS_COPY

This sector contains the register and the password to enable protection on the debug port. If the customer enables this protection, FlashRunner could be still able to rework the device/update the content of the memories. This is achieved if the customer provides the right password to the CONNECT command through FRB or dynamic memory at address 0xAEC00FD0 and following.

UCB_CS_PFLASH_OTP0

The flashing algorithm works only when the field APUBYPASS of this sector is left in delivery state (0x55). In this way APU is not used and CPU0 can access all memories, included CS memories.

If customer requirements would include to enable APU through setting APUBYPASS field to 0xFF in this sector and have the possibility to update the content of the memories in the future on the same product, SMH would evaluate an activity to handle this, upon request.

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UCB programming for TC48xx/TC46xx

The two UCB areas are composed by multiple sectors of the same size (256 bytes): most of the TC4xx memories/debug protections/settings can be customized on these sectors.

In specific address offsets of every sector, one or more confirmation codes are stored; confirmation code stores the status of the sector:

1) UNLOCKED (delivery state)
2) LOCKED

These confirmation codes cannot be left in erased state, otherwise the device would not startup anymore and results in a bricked state.

When data needs to be flashed inside these areas, the algorithm automatically understands the page under process and proceed by programming it with new data and so on with the other pages.

If the algorithm does not detect valid confirmation code set by the user for the sector/sectors that need to be programmed, it will not proceed further and stop the flashing giving back an error.

If the customer attempts to program UCB holes or read-only memories, the algorithm will print out this information as warnings and proceed by checking and eventually program the rest of the data.

UCB_DBGCS_ORIG/UCB_DBGCS_COPY

This sector contains the register and the password to enable protection on the debug port. If the customer enables this protection, FlashRunner could be still able to rework the device/update the content of the memories. This is achieved if the customer provides the right password to the CONNECT command through FRB or dynamic memory at address 0xAEC001D0 and following.

UCB_CS_PFLASH_OTP0

The flashing algorithm works only when the field APUBYPASS of this sector is left in delivery state (0x55). In this way APU is not used and CPU0 can access all memories, included CS memories.

If customer requirements would include to enable APU through setting APUBYPASS field to 0xFF in this sector and have the possibility to update the content of the memories in the future on the same product, SMH would evaluate an activity to handle this, upon request.

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TC49x/TC4Dx family commands

Commands supported:

#TPCMD CONNECT

#TPCMD MASSERASE F|D|f|d

#TPCMD SECTOR_ERASE F|D|f|d <start address> <size>

#TPCMD BLANKCHECK F|D|f|d [<start address> <size>]

#TPCMD PROGRAM F|D|f|d|U|u

#TPCMD VERIFY F|D|f|d|U|u R|S

#TPCMD READ F|D|f|d|U|u [<start address> <size>] (start address and size are mandatory for UCB)

#TPCMD DUMP F|D|f|d|U|u [<start address> <size>] (start address and size are mandatory for UCB)

#TPCMD DISCONNECT

TC46x/TC48x family commands

For these devices a new non-volatile storage has been employed: RRAM. This new technology does not need to be erased nor blankchecked. It is possible to program over and over again without erasing the memory. Furthermore, a verify readout process is already embedded into the flashing routine: these are the reasons why only PROGRAM and VERIFY CRC commands are implemented.

Commands supported:

#TPCMD CONNECT

#TPCMD PROGRAM F|D|f|d|U|u

#TPCMD VERIFY F|D|f|d|U|u S

#TPCMD READ F|D|f|d|U|u [<start address> <size>] (start address and size are mandatory for UCB)

#TPCMD DUMP F|D|f|d|U|u [<start address> <size>] (start address and size are mandatory for UCB)

#TPCMD DISCONNECT

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