# Interfacing FlashRunner 2.0 with HCS08 devices

## Algorithm Notes

Below the protocol supported:

- BDM

Optional Command List:

- `Read/Dump`

## Algorithm Flow

## Trim Function

This function changes the internal reference clock frequency by writing an 8-bit value (TRIM) on a specific register. This frequency enters FLL and becomes the DCO frequency that is requested as a parameter for Trim function. TRIM value is found through an iterative calculation and stored afterwards in Flash during Program execution. This value stored in Flash must be copied into the corresponding register by user code to override the factory trim after any reset.

Depending on trim type there may be another bit (FTRIM), together with TRIM, that controls the smallest adjustment of the internal reference clock frequency. Also if DRS register is present there are more than one range of trimmable frequencies.

The Flash Address parameter (used to select where TRIM and FTRIM will be stored in Flash memory) can be set by the user or not: in the last case a default value from database is used.

Trim is also called to set FLL from other functions: in this case the frequency passed is the internal reference clock.

## SAWTRIM value

Related to device SC9S08ER48. It is a factory trimmed value that is stored in a specific register inside Flash memory and has to be maintained after masserase and program operations. It is read during connect phase, temporarily stored in a global variable and then substituted to corresponding frb value during Flash programming and verify operations. If needed it is also possible to set/overwrite current SAWTRIM value using SAWTRIM specific command.

## Security

HCS08 devices include circuitry to prevent unauthorized access to the contents of FLASH, EEPROM and RAM memory. Security is engaged or disengaged based on the state of two bits of FOPT register. During reset, the contents of the nonvolatile location NVOPT are copied from FLASH into the working FOPT register space. Writing 0xFE on NVOPT location unlocks security (0xFF locks it!).

For HCS08 devices Masserase function automatically unlocks the memory while HCS08_B need the Unsecure function.



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# Commands List

Memory types:
F → Flash
E → Eeprom

## MASSERASE

**MASSERASE** <F|E|C>

This function performs a Masserase for Flash, Eeprom.

**NB.:** For erase Eeprom of MC9S08DN32 is necessary perform MASSERASE C

## BLANKCHECK

**BLANKCHECK** <F|E> or BLANKCHECK <F|E> <start_addr> <size>

Blankcheck command for Flash or Eeprom - Auto or Manual mode allowed

## PROGRAM

**PROGRAM** <F|E> or PROGRAM <F|E> <start_addr> <size>

Program command for Flash, Eeprom - Auto or Manual mode allowed

## VERIFY

**VERIFY** <F|E> <R|S|> or VERIFY <F|E> <R|S> <start_addr> <size>

Verify command for Flash, Eeprom - Auto or Manual mode allowed.

R – Normal verify with Read-Out method

S – Normal verify with Checksum method

## READ

**READ** <F|E> <start_addr> <size>

Read function for Flash, Eeprom – Address check

## DUMP

**DUMP** <F|E> <start_addr> <size>

Dump function for Flash, Eeprom – Address check

## TRIM

**TRIM** <frequency> <precision> <flash_addr>

frequency – DCO frequency, not the internal oscillator frequency

precision – percentage of tolerated error



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flash_addr – address of Flash where trim value is stored (optional)

Trim function: changes the internal reference clock frequency

## SAWTRIM

```
SAWTRIM <value>
```

value - new SAWTRIM value

## GET_FREQ_VAL

Get_freq_val function: print FCDIV register content and BDM frequency value

## RUN

Run function: resets the device and run the program in memory

## UNSECURE

Unsecure function: unprotects the device (only for HCS08_B)

## CONNECT

Connect function: Power on and entry

## DISCONNECT

Disconnect function: Power off and exit



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