

# AN00177: Interfacing FlashRunner with NXP NCF devices

FlashRunner is a Universal In-System Programmer, which uses the principles of In-Circuit Programming to program NXP NCF family microcontrollers.

This Application Note assumes that you are familiar with both FlashRunner and the main features of the NCF family. Full documentation about these topics is available in the FlashRunner user's manual and in device-specific datasheets.

## 1. Introduction

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In-system programming of NCF microcontrollers is performed through MDI protocol.

In order to use FlashRunner to perform in-system programming, you need to implement the appropriate in-circuit programming hardware interface on your application board.

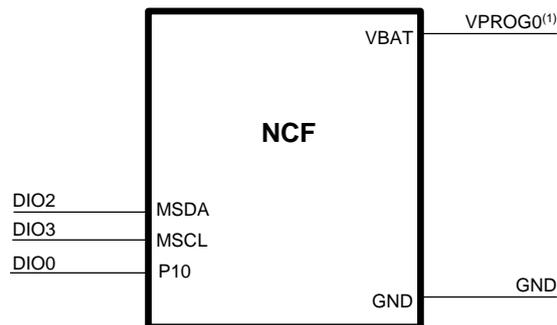
## 2. Hardware Configuration

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The microcontroller lines needed to program an NCF device through MDI protocol are the following:

- **MSCL:** Monitor Serial Clock;
- **MSDA:** Monitor Serial Data.
- **P10:** wake-up pin of the MCU.

The lines mentioned above must be connected to the FlashRunner's "ISP" connector according to the following diagram:



<sup>(1)</sup> Connect this line if you want FlashRunner to automatically

## 3. Specific TCSETPAR Programming Commands

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### Overview

**TCSETPAR** commands set device-specific and programming algorithm-specific parameters. These commands must be sent after the **TCSETDEV** command and before a **TPSTART** / **TPEND** command block.

All of the following parameters must be correctly specified through the relative **TCSETPAR** commands (although the order with which these parameters are set is not important):

- Baudrate.

### **TCSETPAR CMODE**

Command syntax:

**TCSETPAR BAUDRATE <baudrate value>**

Parameters:

**Baudrate value:** Specifies the baudrate value to use.

Description:

Specifies the baudrate at which the device will be set.

## **4. Specific TPCMD Programming Commands**

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### **Overview**

**TPCMD** commands perform a programming operation (i.e. mass erase, program, verify, etc.). These command must be sent within a **TPSTART** / **TPEND** command block.

Renesas NCF-specific target programming commands are the following:

- **TPCMD BLANKCHECK;**
- **TPCMD PROGRAM;**
- **TPCMD VERIFY;**
- **TPCMD READ;**
- **TPCMD DUMP;**
- **TPCMD PROTECT;**

## TPCMD BLANKCHECK

Command syntax:

```
TPCMD BLANKCHECK F|E <tgt start addr> <len>
```

Command parameters and options:

**F|E:** Specifies Flash (**F**), EEPROM (**E**) memory.

**tgt start address:** Device memory location from where the blankcheck operation will start.

**len:** Number of locations to be blankchecked.

Description:

Blankchecks Flash, EEPROM or Extended user area Flash memory. Blankchecks **len** locations starting from the address specified by **tgt start address**.

## TPCMD PROGRAM

Command syntax:

```
TPCMD PROGRAM F|E <src offset> <tgt start addr> <len>
```

Command parameters and options:

**F|E:** Specifies Flash (**F**), EEPROM (**E**) memory.

**src offset:** Offset from the beginning of the source memory.

**tgt start addr:** Device memory location from where the program operation will start.

**len:** Number of locations to be programmed.

Description:

Programs **len** locations of Flash or EEPROM memory starting from the **tgt start addr** address.

## TPCMD VERIFY

Command syntax:

```
TPCMD VERIFY F|E R <src offset> <tgt start addr> <len>
```

Command parameters and options:

<b>F E:</b>	Specifies Flash ( <b>F</b> ), EEPROM ( <b>E</b> ) memory.
<b>R:</b>	Specifies Readout method ( <b>R</b> ).
<b>src offset:</b>	Offset from the beginning of the source memory.
<b>tgt start addr:</b>	Device memory location from where the verify operation will start.
<b>len:</b>	Number of locations to be verified.

Description:

Verifies **len** locations of Flash or EEPROM memory starting from the **tgt start addr** address.

## TPCMD READ

Command syntax:

```
TPCMD READ F|E <tgt start addr> <len>
```

Command parameters and options:

<b>F E:</b>	Specifies Flash ( <b>F</b> ), EEPROM ( <b>E</b> ) memory.
<b>tgt start addr:</b>	Device memory location from where the read operation will start.
<b>len:</b>	Number of locations to be read.

Description:

Reads **len** locations of Flash or EEPROM memory starting from the **tgt start addr** address.

## TPCMD DUMP

Command syntax:

```
TPCMD DUMP F|E <src offset> <tgt start addr> <len>
```

Command parameters and options:

<b>F E:</b>	Specifies Flash ( <b>F</b> ), EEPROM ( <b>E</b> ) memory.
<b>src offset:</b>	Offset from the beginning of the source memory.
<b>tgt start addr:</b>	Device memory location from where the dump operation will start.
<b>len:</b>	Number of locations to be dumped.

Description:

Dumps **len** locations of Flash or EEPROM memory starting from the **tgt start addr** address.

## TPCMD PROTECT

Command syntax:

```
TPCMD PROTECT
```

Command parameters and options: none

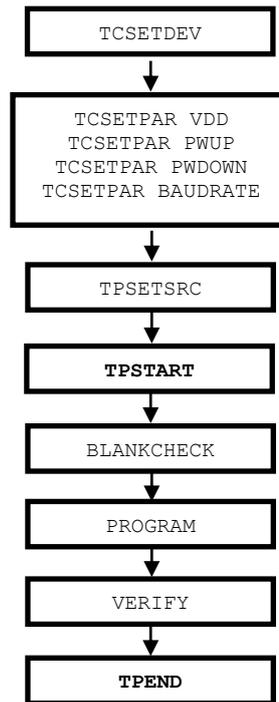
Description:

Protects the device.

## 5. Typical Programming Flow

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The following flow chart illustrates typical steps to help you write your own script file.



## 6. Script Example

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The example below shows a typical programming flow for NXP NCF29A1 device.

```
;
; FLASHRUNNER SCRIPT EXAMPLE FOR NXP NCF29A1
;
; Use this example as a starting point for your specific programming needs
;
; -----
;
; Hardware connections
;
; DIO0 (Reset - OPTIONAL)
; DIO2 (MSDA)
; DIO3 (MSCL)
;

; Turns off logging
#LOG_OFF

; Halt on errors
#HALT_ON FAIL

; Sets device
TCSETDEV NXP NCF29A1 NCF

; Target voltage for programming and erase, mV (change as needed)
; VDD range: 1800 - 3600 mV
TCSETPAR VDD 2700

; VDD rise-time, ms (from 0 ms to 65535 ms)
TCSETPAR PWUP 10

; VDD fall-time, ms (from 0 ms to 65535 ms)
TCSETPAR PWDOWN 100

; Set baudrate (accepted values are 1M, 500K, 250K and 125K (default))
TCSETPAR BAUDRATE 125K
```

```

; Image file to be programmed (must be placed in the \BINARIES directory) .
TPSETSRC FILE TEST.FRB

;-----
;Programming operation
;-----

; Starts programming block and erases EROM and EEPROM memories (except block 15)
TPSTART

; Checks if EROM memory is blank
TPCMD BLANKCHECK F $0000 $8000

; Programs EROM memory; size and address must be 2 bytes aligned
TPCMD PROGRAM F $0000 $0000 $8000

; Verifies EROM memory; size and address must be 2 bytes aligned
TPCMD VERIFY F R $0000 $0000 $8000

; Checks if EEPROM memory is blank; address must be 4 bytes aligned
TPCMD BLANKCHECK E $0000 $0800
; EEPROM block 15
;TPCMD BLANKCHECK E $0F00 $0100

; Programs EEPROM memory; address must be 4 bytes aligned
TPCMD PROGRAM E $0000 $0000 $0800
; EEPROM block 15
;TPCMD PROGRAM E $0F00 $0F00 $0100

; Verifies EEPROM memory; address must be 4 bytes aligned
TPCMD VERIFY E R $0000 $0000 $0800
; EEPROM block 15
;TPCMD VERIFY E R $0F00 $0F00 $0100

; Ends programming block and Power Down
TPEND

```

The FlashRunner's system software setup will install script examples specific for each device of the NCF family on your PC.

## 7. Programming Times

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The following table shows programming times for selected NXP NCF family devices.

Device	Mem. Size	Conditions	Operations	Time
NCF29A1	32KB F + 2KB E	VDD=3,3V,MDI,BAUDRATE=1000000	Erase+BlankCheck+Program+Verify	6,53

Programming times depend on Programming Algorithm version, target board connections, communication mode, target microcontroller mask, and other conditions. Programming times for your actual system may therefore be different than the ones listed here. SMH Technologies reserves the right to modify Programming Algorithms at any time.