STM32 Unique ID

This tutorial will introduce the STM32 Unique ID security feature. The Unique Device Identifier is installed at the ST factory and provides a reference number unique for any STM32.

- UDI is suitable for:
  - Generating serial number from some algorithm
  - Cryptographic key derivation
- UDI is 96 bits in length and composed of:
  - Lot number
  - Wafer ID
  - Coordinate X and coordinate Y of die

Hardware:

- Nucleo-L476RG board(64-pin),available at: www.st.com/en/evaluation-tools/nucleo-l476rg.html
- Standard-A -to- Mini USB cable

Literature:

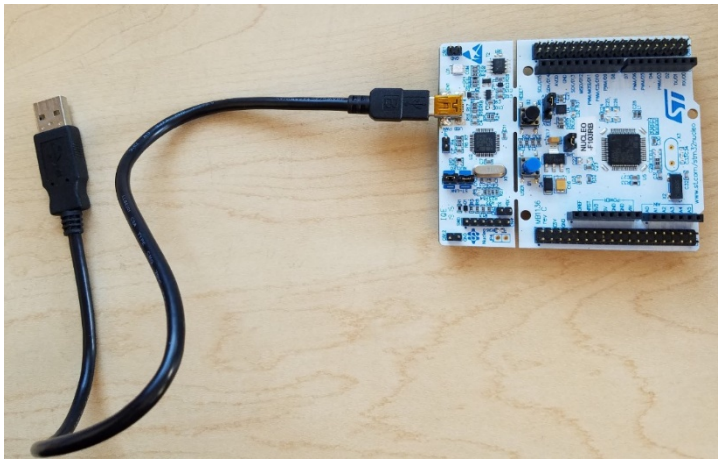
- STM32L476xx Datasheet
- UM1724 User manual STM32 Nucleo-64 boards
- UM1884 Description of STM32L4/L4+ HAL and low-layer drivers
- UM1718 User manual STM32CubeMX for STM32 configuration and initialization C code generation
- RM0351 Reference Manual

Stages

- 1: Connect device
- 2: Look up Unique ID description
- 3: Launch Cube Programmer
- 4: Get device information

1: Connect Device

Any code may be loaded on to the device. For this tutorial a basic Blinky example is on the board.



2: Look up Unique ID Description

Open RM0351 Reference manual and navigate to the Unique device ID register description.

49.1 Unique device ID register (96 bits)

The unique device identifier is ideally suited:

- for use as serial numbers (for example USB string serial numbers or other end applications)
- for use as part of the security keys in order to increase the security of code in Flash memory while using and combining this unique ID with software cryptographic primitives and protocols before programming the internal Flash memory
- to activate secure boot processes, etc.

The 96-bit unique device identifier provides a reference number which is unique for any device and in any context. These bits cannot be altered by the user.

Base address: 0x1FFF 7590

Address offset: 0x00

Read only = 0xXXXX XXXX where X is factory-programmed

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
UID[31:16]															
r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
UID[15:0]															
r	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r

Bits 31:0 **UID[31:0]:** X and Y coordinates on the wafer

Bits 31:8 **UID[63:40]:** LOT_NUM[23:0]
Lot number (ASCII encoded)

Bits 7:0 **UID[39:32]:** WAF_NUM[7:0]
Wafer number (8-bit unsigned number)

Address offset: 0x08

Read only = 0xXXXX XXXX where X is factory-programmed

Here we can see the base address as: 0x1FFF 7590.

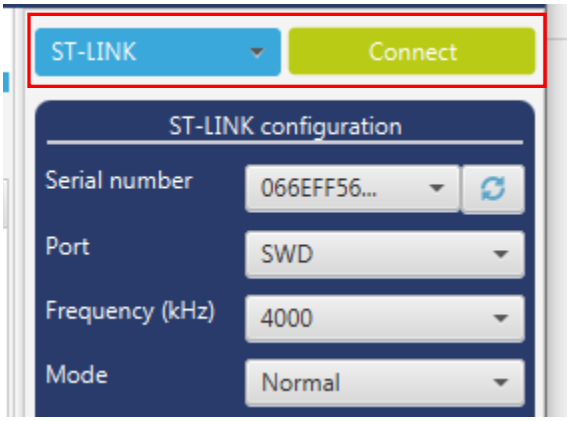
UID[31:0] represents the X and Y coordinates on the wafer

UID[63:40] represent Lot number

UID[39:32] represent Wafer number

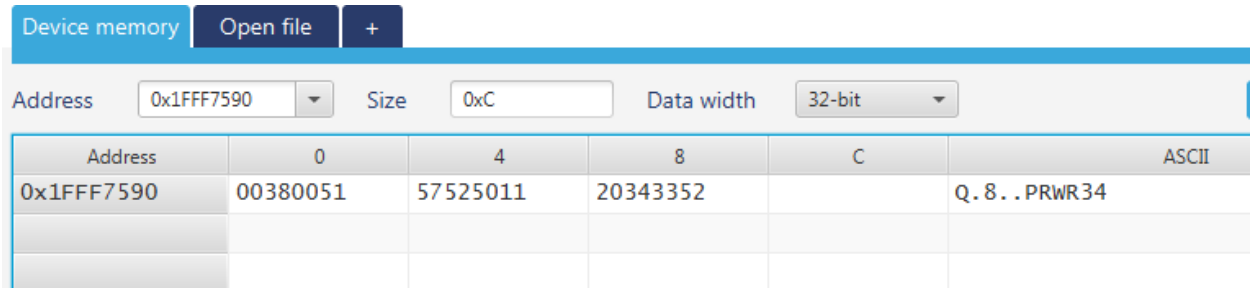
3: Launch Cube Programmer

Launch STM32CubeProgrammer. Select ST-Link and click connect. The flash memory will be shown.



4: Get device information

Type the base address into the “Address” paramter and set size to 0xC as shown below.



We can see:

Address offset 0x00: 0x00380051 - X and Y coordinates on the wafer

Address offset 0x04: 0x57525011

0x575250 - Lot number

0x00 – Wafer number

Address offset 0x08: 0x20343352 Lot number