NuMicro
Tool Installation and Practice

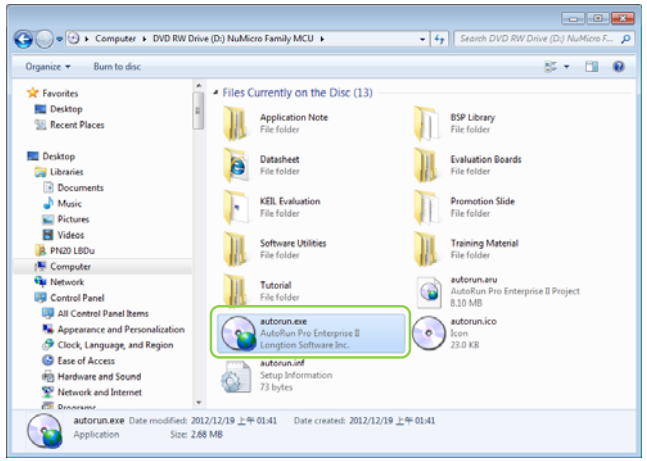
NuMicro@nuvoton.com

Agenda

- Disc Content Introduction
- Software Installation
- NuEdu-SDK-M451 Introduction
- Run 1st NuEdu sample
- NuMicro Product Flow Chart
- Tools

Disc Content Introduction

Software Installation



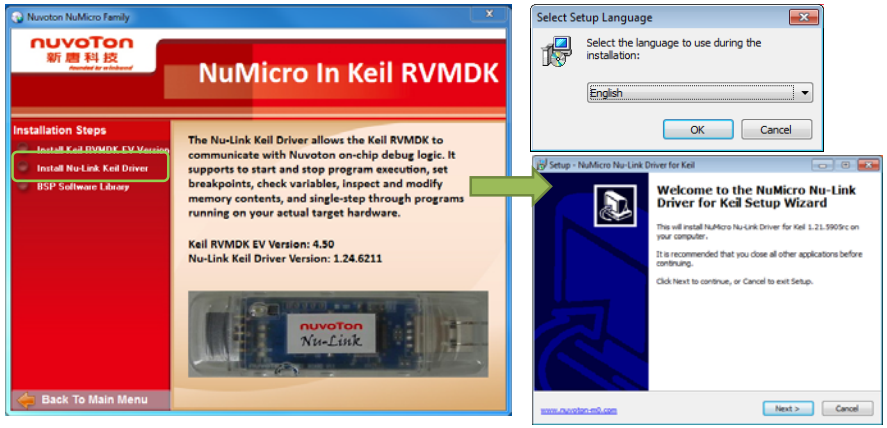
Double Click “autorun.exe”

Step 1. Install the Keil uVision4

1. Keil RVMDK EV Version
2. Install Keil RVMDK EV Version

The Keil uVision4 evaluation version (32 KB code size limitation) can be downloaded from Keil website www.keil.com

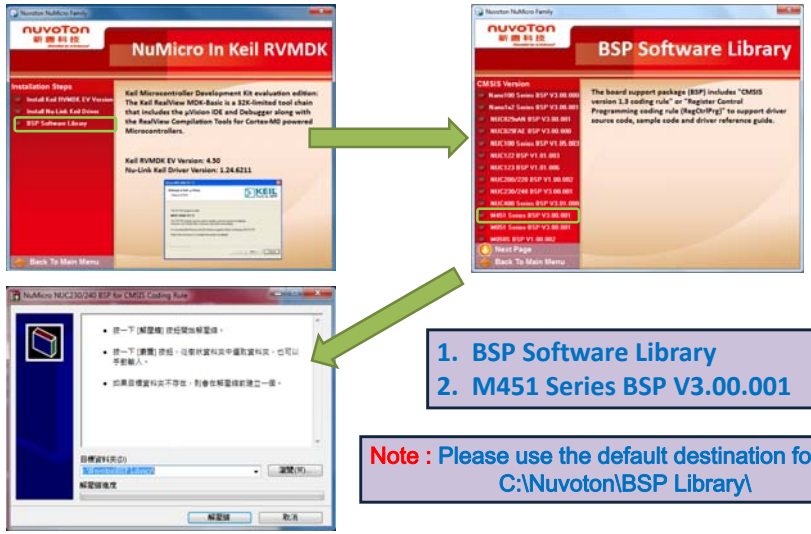
Step 2. Install Nu-Link Keil Driver



Note : Please close the Keil application program when installing Nu-Link Keil driver.

The "Nu-Link Driver" can be downloaded from nuvoTon website www.nuvoton.com

Step 3. Copy M451 Series BSP



1. BSP Software Library
2. M451 Series BSP V3.00.001

Note : Please use the default destination folder.
C:\Nuvoton\BSP Library\

NuEdu-SDK-M451
Education / Development Kit

Agenda

- NuEdu-SDK board?
- Feature
- Hardware Settings
- Sample Code for NuEdu
- Supported Function List

NuEdu Concept

NuTiny Board

Learning Board

NuEdu-SDK Board

Box

- Compatible with Arduino Platform
- Easy to implement NuMicro project
- Portable Development Kit

What's Inside in NuEdu-SDK-M451 ?

(1)NuEdu-EVB-M451

(2)NuEdu-Basic01

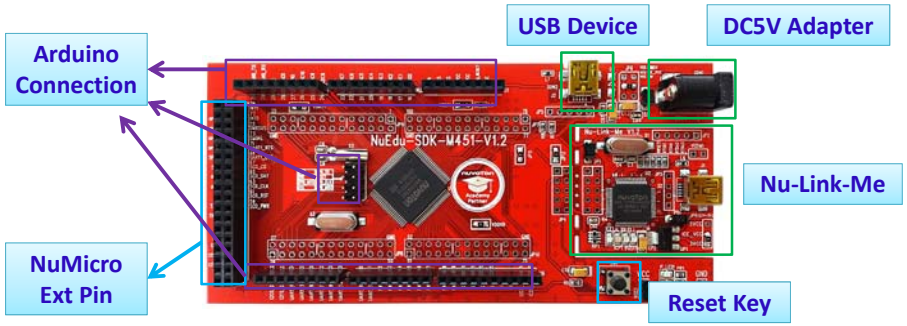
(3)Nu-Bridge

(4)Connector and USB Line

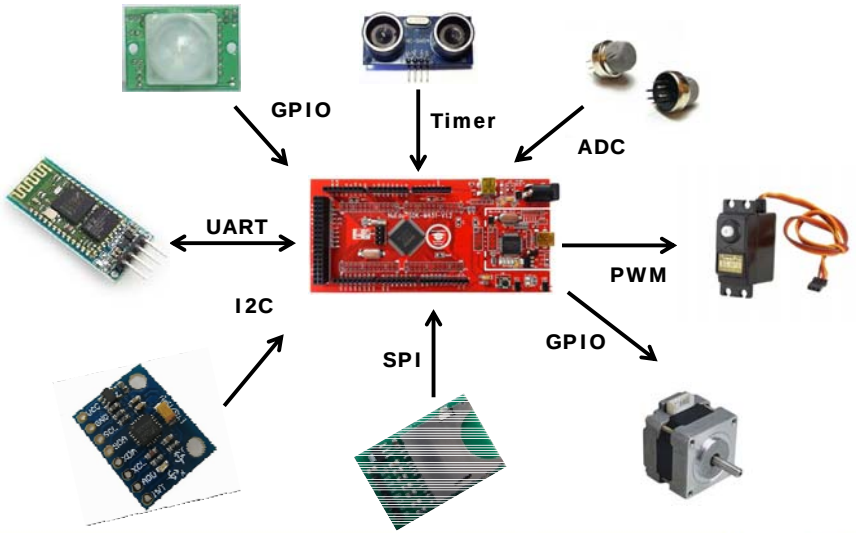
Feature

Feature

- An Evaluation or development kit for M451 Series
- Support Keil RVMDK, IAR EWARM development environment
- Support on-line ICP(In-Circuit Programming)
- Pin-compatible with Arduino



NuEdu-EVB-M451 with Module



Different Kinds of Combinations

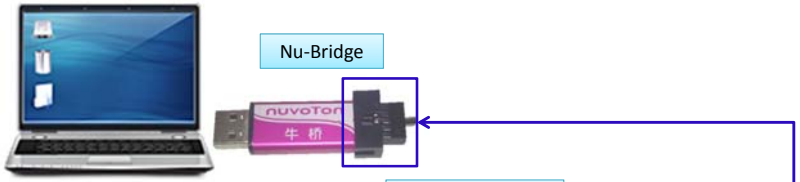
Combinations

NuEdu-EVB-M451

+

NuEdu-Basic01

NuEdu-Basic01 and Nu-Bridge



Single VCOM

I2C Master and Monitor
SPI Master and Monitor
PWM Capture
PWM Output
ADC
.
.

Other Arduino Kits

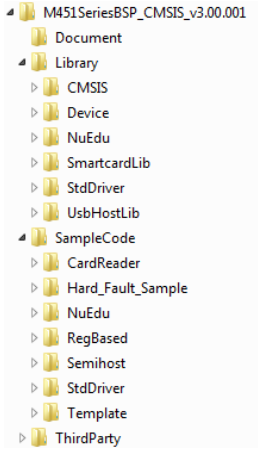
Compatible with Any Other Arduino Kits

Sample Code for NuEdu

Advantage for BSP 3.00

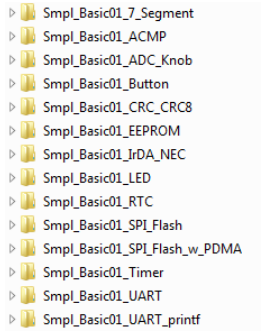
- **Unify API name**
- **Lower barrier for engineer**
- **Rich applications inside**

M451SeriesBSP_CMSIS_V3.00.001



- **Document**
  - API description
- **Library**
  - CMSIS, MCU initiation
- **SampleCode**
  - Sample Code Procedure
- **ThirdParty**
  - Third Party Tool (M4 only)

Sample Code Naming Rule



NuEdu-Basic01

Naming Rule:

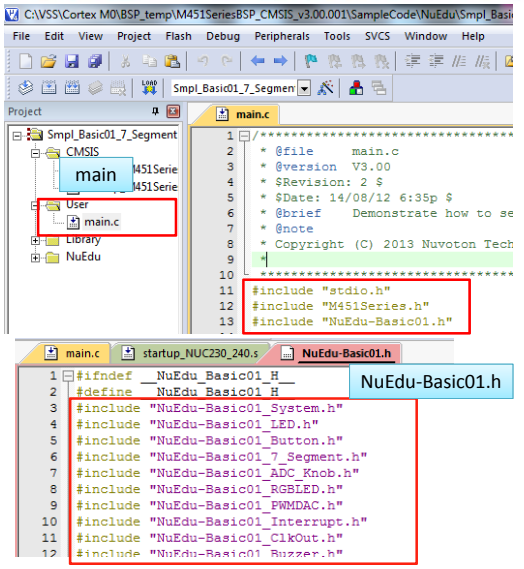
Smpl_board name_function

=>Smpl_Basic01_StartKit

Support various adapter board in the future

EX: Advance, Wi-Fi, Sensor…

Including Header file



(1)Include adapter board header file to Main procedure
=>NuEdu-Basic01.h

(2)All function header files in adapter board header file
=>NuEdu-Basic01_LED.h
=>NuEdu-Basic01_Buzzer.h

Header File Naming Rule:

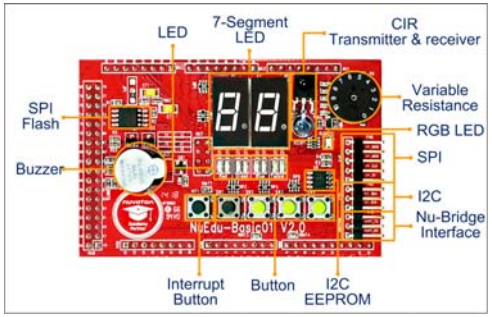
NuEdu-board name_function

=>NuEdu-Basic01_7_Segment.h

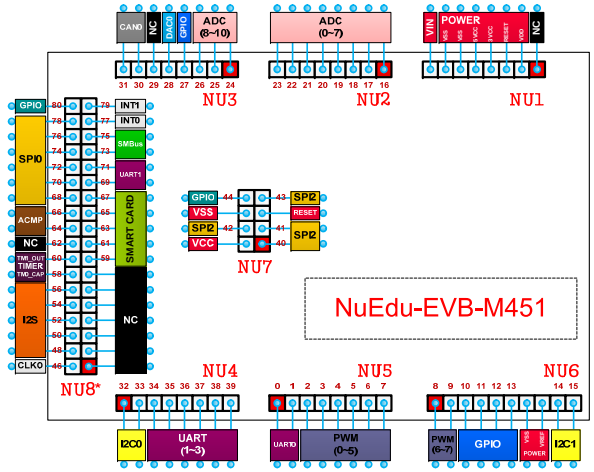
Supported Function List

Supported Function List

- SPI Flash Access
- I2C EEPROM Access
- ADC and Comparator
- PWM DAC to ADC
- PWM and Capture
- Buzzer
- CIR TX and RX
- Button
- LED
- TM0 Output and TM1 Capture
- Interrupt input
- 7 Segment
- PWM LED



Pin Assignment



Pin Definition (1/3)

	Header	Function	Basic01
NU1	NU1.1	NC	
	NU1.2	VDD	VDD
	NU1.3	MCU_RESET	MCU_RESET
	NU1.4	3VCC	3VCC
	NU1.5	5VCC	5VCC
	NU1.6	VSS	VSS
	NU1.7	VSS	VSS
	NU1.8	VIN	
NU2	NU2.1	PB.9/ADC6	ADC_MEASURE
	NU2.2	PB.10/ADC7	ADC_IN
	NU2.3	PB.11/ADC8	7-Segment_A
	NU2.4	PB.12/ADC9	7-Segment_B
	NU2.5	PB.13/ADC10	7-Segment_C
	NU2.6	PB.14/ADC11	7-Segment_D
	NU2.7	PB.15/ADC12	7-Segment_E
	NU2.8	PB.5/ADC13	7-Segment_F

	Header	Function	Basic01
NU3	NU3.1	PB.6/ADC14	Button_3
	NU3.2	PB.7/ADC15	Button_4
	NU3.3	PB.1/ADC1	LED_6
	NU3.4	PC.7	LED_7
	NU3.5	PB.0/DAC	PWM_DAC
	NU3.6	-	LED_8
	NU3.7	PA.13/CAN0_RX	
	NU3.8	PA.12/CAN0_TX	
NU4	NU4.1	PD.5/I2C0_SCL	I2C_SCL
	NU4.2	PD.4/I2C0_SDA	I2C_SDA
	NU4.3	PB.2/UART_RX1	LED_1
	NU4.4	PB.3/UART_TX1	LED_2
	NU4.5	PC.3/UART_RX2	LED_3
	NU4.6	PC.2/UART_TX2	LED_4
	NU4.7	PA.9/UART_RX3	LED_5
	NU4.8	PA.8/UART_TX3	Button_2

Pin Definition (2/3)

	Header	Function	Basic01
NU5	NU5.1	PD.6UART_RX0	NUCOM1_RX
	NU5.2	PD.1/UART_TX0	NUCOM1_TX
	NU5.3	PC.9/PWM1_0	LED_R
	NU5.4	PC.10/PWM1_1	LED_G
	NU5.5	PC.11/PWM1_2	LED_B
	NU5.6	-	PWM Cap
	NU5.7	PC.13/PWM1_4	PWM_DAC
	NU5.8	PC.14/PWM1_5	BUZZER
NU6	NU6.1	PE.3/PWM0_3	PWM_OUT
	NU6.2	PD.7PW0_5	CIR_Cap
	NU6.3	PD.11	7-Segment_G
	NU6.4	PF.2	7-Segment_H
	NU6.5	PD.8	7-Segment_CTRL1
	NU6.6	PC.8	7-Segment_CTRL2
	NU6.7	VSS	VSS
	NU6.8	VREF	VREF
	NU6.9	PE.0I2C1_DAT	EEPROM
	NU6.10	PC.4/I2C1_SCL	EEPROM

	Header	Function	Basic01
NU7	NU7.1	PD.14/SPI0_MISO	SPI FLASH
	NU7.3	PD.15/SPI0_CLK	SPI FLASH
	NU7.5	MCU_RESET	MCU_RESET
	NU7.7	PD.12/SPI0_SS	SPI FLASH
	NU7.2	VCC	VCC
	NU7.4	PD.13/SPI0_MOSI	SPI FLASH
	NU7.6	VSS	VSS
	NU7.8	PE.2	BUTTON_1

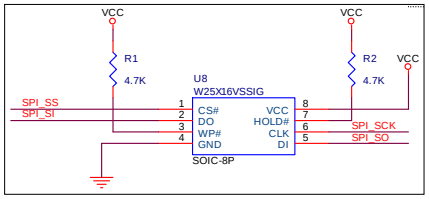
Pin Definition (3/3)

	Header	Function	Basic01
NU8	NU8.1	-	
	NU8.3	-	
	NU8.5	-	
	NU8.7	-	
	NU8.9	-	
	NU8.11	-	
	NU8.13	-	
	NU8.15	PE.4/SC0_PWR	
	NU8.17	PE.5/SC0_RST	
	NU8.19	PA.0/SC0_CLK	
	NU8.21	PA.1/SC0_DAT	
	NU8.23	PE.1/SC0_CD	
	NU8.25	PB.4/UART1_CTS	
	NU8.27	PB.8/UART1_RTS	
	NU8.29	PA.14/SMBAL	
	NU8.31	PA.15/SMBSUS	
	NU8.33	PD.3/INT1	Interrupt_Button
	NU8.35	PC.0/INT2	

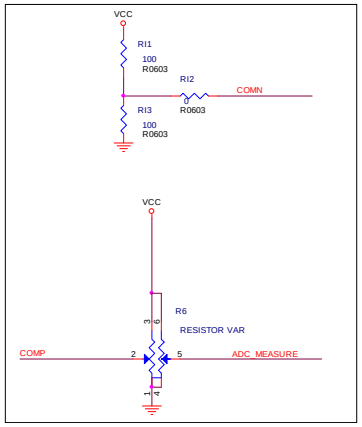
	Header	Function	Basic01
NU8	NU8.2	PC.1/CLKO	CLKO
	NU8.4	PD.0/I2S_MCLK	
	NU8.6	PA.4/I2S_LRCK	
	NU8.8	PA.7/I2S_BCLK	
	NU8.10	PA.6/I2S_DI	
	NU8.12	PA.5/I2S_DO	
	NU8.14	PD.2/TM0_CAP	TM0_CAP
	NU8.16	PD.10/TM2_OUT	TM1_OUT
	NU8.18	-	ACMP_N
	NU8.20	PD.9/ACMP1_P3	ACMP_P
	NU8.22	PC.6/ACMP1_O	
	NU8.24	PE.12/SPI0_SS	SPI_SS
	NU8.26	PE.13/SPI0_CLK	SPI_CLK
	NU8.28	PE.10/SPI0_MISO0	SPI_MISO0
	NU8.30	PE.11/SPI0_MOSI0	SPI_MOSI0
	NU8.32	PE.8/SPI0_MISO1	
	NU8.34	PE.9/SPI0_MOSI1	
	NU8.36	PC.5	

NuEdu-Basic01 Function(1/4)

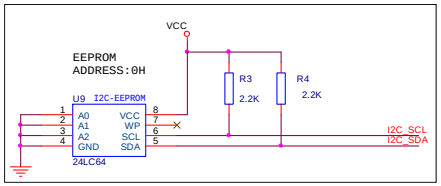
SPI Flash Access



ADC and Comparator

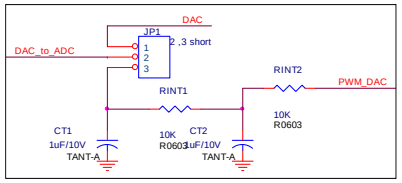


I2C EEPROM Access

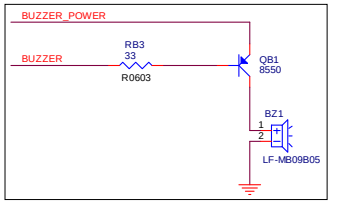


NuEdu-Basic01 Function(2/4)

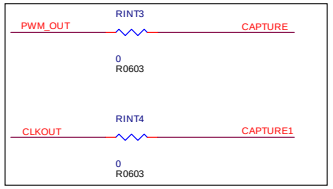
PWM(DAC) to ADC



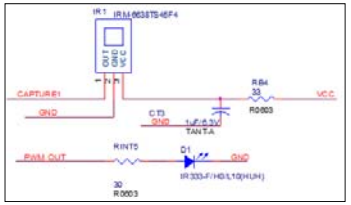
Buzzer



PWM and Capture

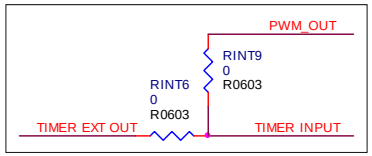


CIR TX and RX

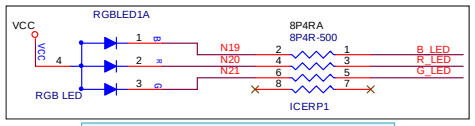


NuEdu-Basic01 Function(3/4)

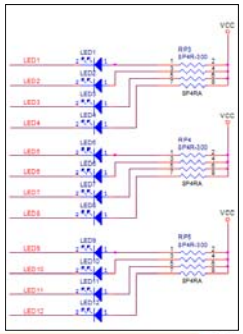
TM0 Output and TM1 Capture



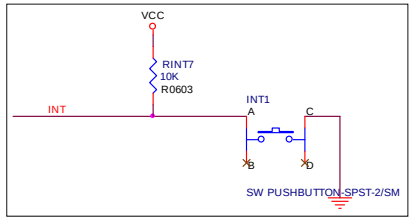
PWM LED



LED

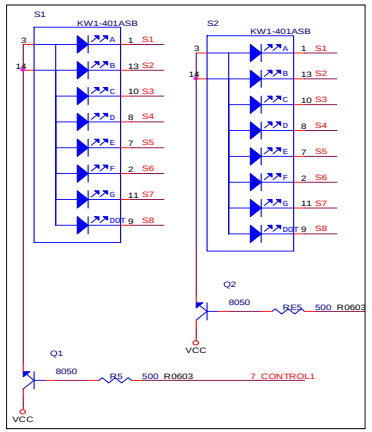


Interrupt input

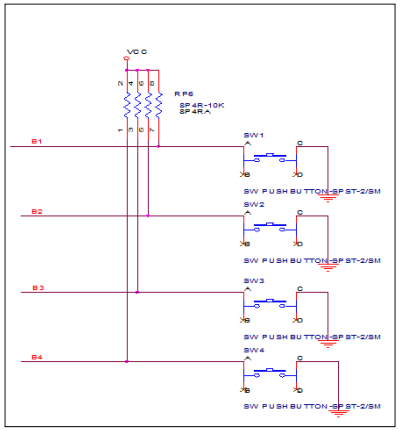


NuEdu-Basic01 Function(4/4)

7 Segment

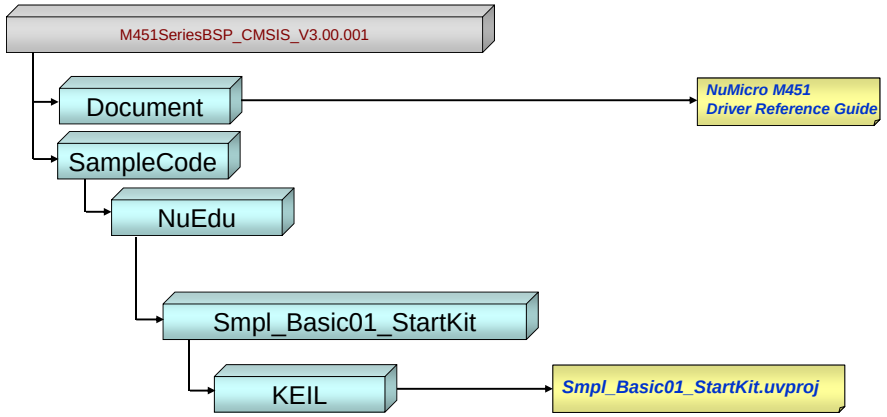


Button



Run 1st NuEdu sample

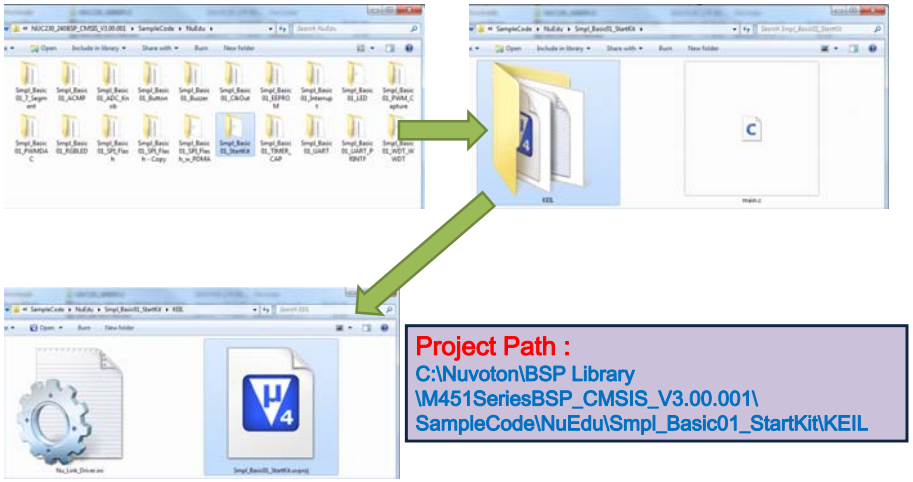
1st NuEdu-SDK-NUC240 Project



Step 1. Hardware Connection

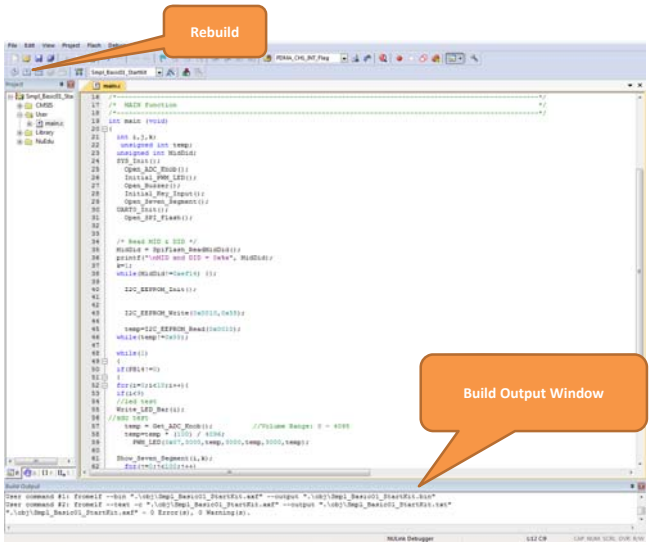
NuEdu-EVB-M451

Step 2. Double Click to enter the project

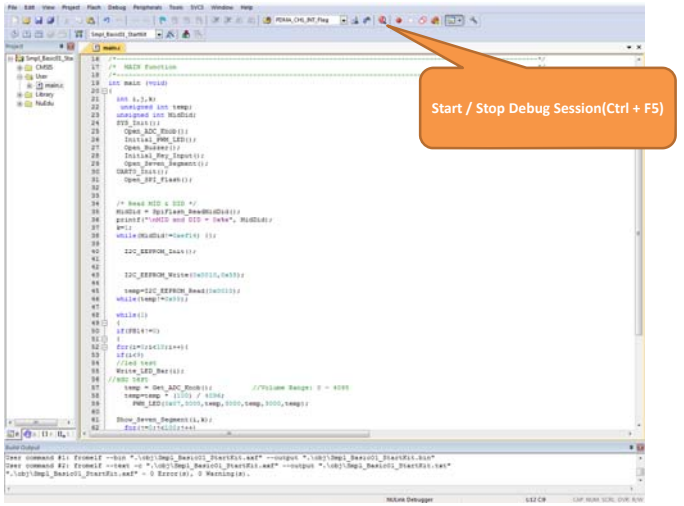


Project Path :
C:\Nuvoton\BSP Library
\M451SeriesBSP_CMSIS_V3.00.001\
SampleCode\NuEdu\Smpl_Basic01_StartKit\KEIL

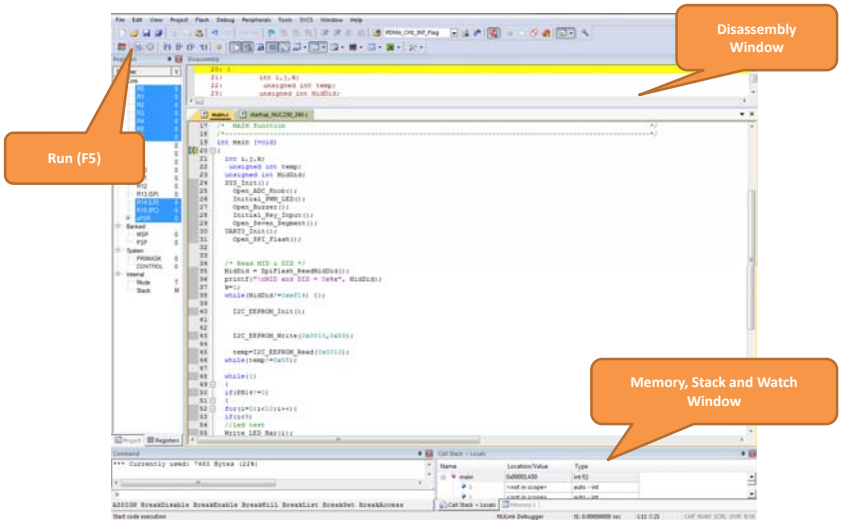
Step 3. Build the Project



Step 4. To Download & Enter Debug

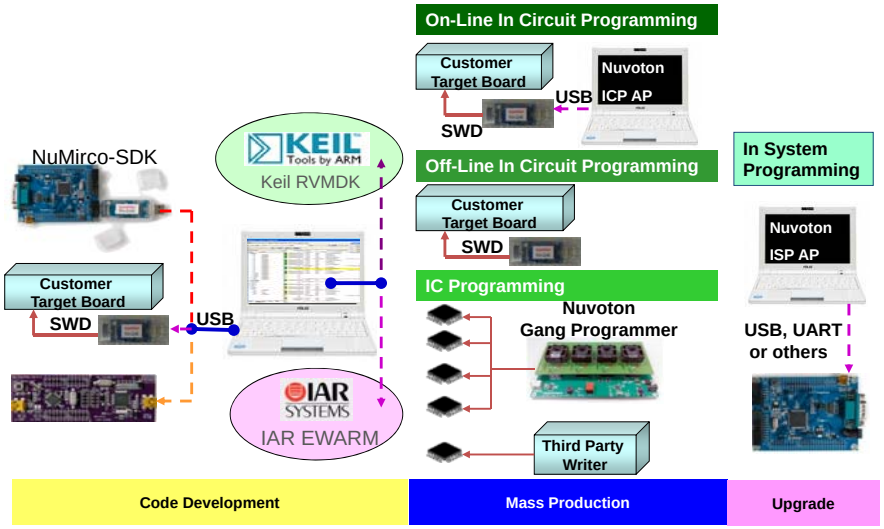


Step 5. Press or “F5” to run the code



NuMicro Product Flow Chart

NuMicro Product Flow Chart

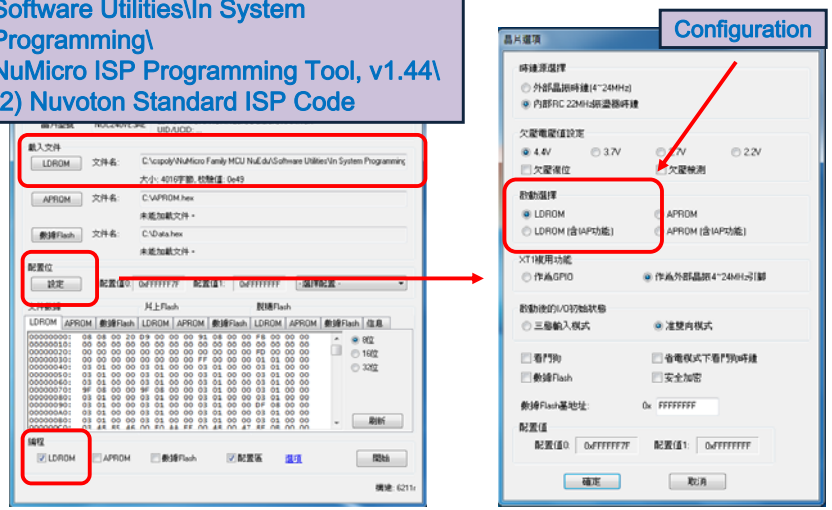


Tools

- **NuMicro ICP Programming Tool**
- **NuMicro ISP Programming Tool**
- **NuGang Programmer**
- **Nu-Bridge**
  - Nu-Bridge or NuCOM
  - Nuduino
- **Nu-Link**
  - Nu-Link-Me
  - Nu-Link
  - Nu-Link-Pro

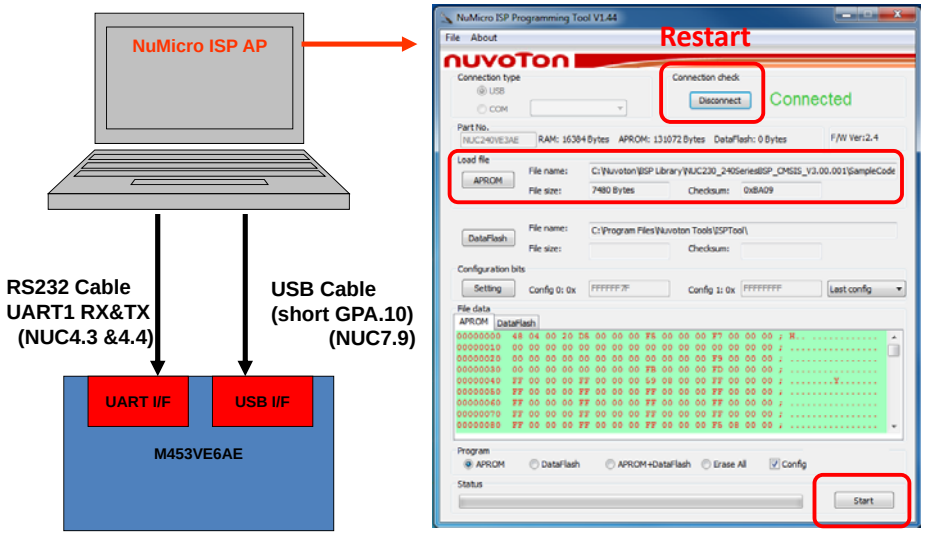
Program The NuMicro ISP Firmware Code

Software Utilities\In System Programming\
NuMicro ISP Programming Tool, v1.44\
(2) Nuvoton Standard ISP Code



NuMicro ISP firmware code: ISP_Code_M451_vx.x.bin

ISP (In System Programming)

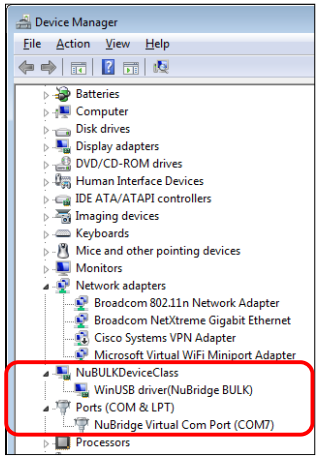


NuGang Programmer - Feature

- **4-chip gang programming**
- **128 k flash size only needs 10 sec.**
- **Easy off-line copying operation**
  - On-line downloading: by engineer
  - Off-line copying operation: for production line's operator
- **Good data security**
  - No source-chip copying
  - Code data downloaded in the programmer are well encrypted
- **Different adapter boards for different chip packages**

Nu-Bridge Driver & FW update

1. Install WinUSB4NuVCOM driver
2. Update Nu-Bridge FW (Short Blue Line & Orange Line)
3. Remove the "Short" line
4. Plug out & Plug in



Check Detail about Nu-Bridge:
牛臥堂
http://www.nuvoton-m0.com/forum.php

Install Nu-Bridge Driver on Win8

- **Disable driver signature enforcement**

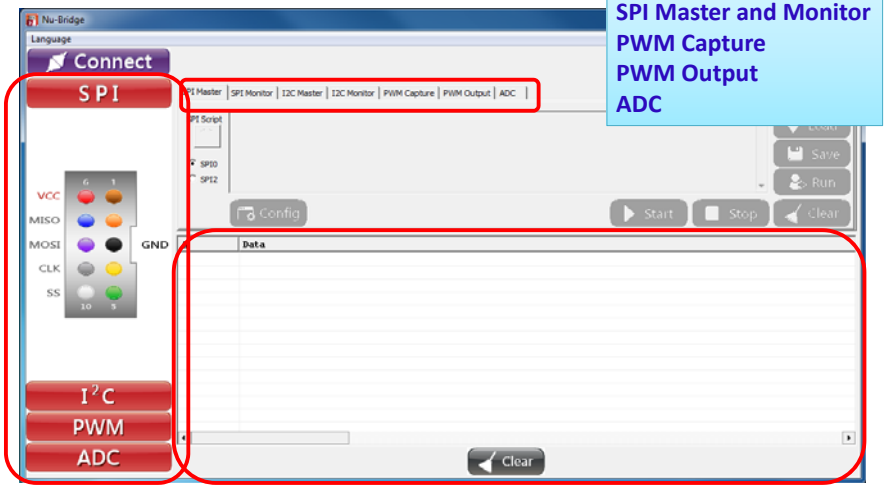
1. Open the Charm menu, then click the gear icon (Settings)
2. Click **Change PC settings** -> Click **General**
3. Under **Advanced startup**, click **Restart now**

Note: In Windows 8.1, the 'Restart Now' button has moved to "PC Setting -> Update & Recovery -> Recovery"

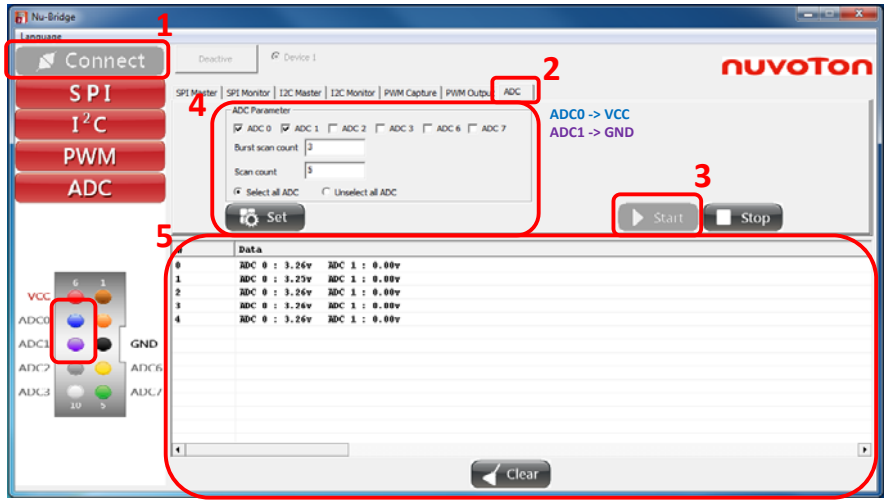
5. After restarting, click **Troubleshoot** -> Click **Advanced options** -> Click **Startup Settings** -> Click **Restart**
6. After restarting, typing the **number 7** to Disable driver signature enforcement
7. Install WinUSB4NuVCOM driver

Nu-Bridge GUI

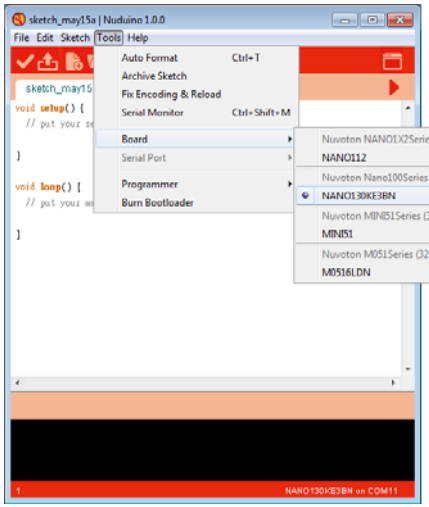
Single VCOM
I2C Master and Monitor
SPI Master and Monitor
PWM Capture
PWM Output
ADC



Nu-Bridge Exmple: ADC



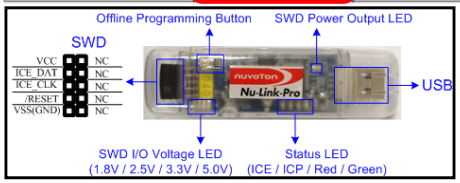
Nuduino



- **Support NuEdu-SDK Kit**
- **Arduino concept base**
  - GPIO 0 ~ 44 (Arduino)
  - GPIO 45 ~ 80 (Nuvoton)

Nu-Link

Function \ Type	Nu-Link-Pro	Nu-Link	Nu-Link-Me
Debugging	✔	✔	✔
Online Programming	✔	✔	✔
Offline Programming	✔	✔	
Multi SWD I/O Voltage	✔		
SWD I/O Voltage Support	1.8V, 2.5V, 3.3V, 5.0V	5.0V	3.3V (default), 5.0V (3.3V for On-board version only)



Q & A

Thank You