

ARM® Cortex®-M **32-bit Microcontroller**

NuMicro™ Family **Nu-DIP-M0516** **User Manual**

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1 简述

Nu-DIP-M0516是一款低成本、易用的核心转接板，完整提供开发所需要的组件，包含四颗LED与USB电源，与标准DIP 8051脚位兼容，可轻易地将系统由8位升级为32位，搭配新唐所提供的BSP包，让使用者能快速进行应用开发。

- M0516LDE cortex-M0 处理器，主频频率 50MHZ，64KB Flash，4KB RAM
- 尺寸 5cm X 1.8cm，大小与脚位间距与 DIP 包装的 8051 完全相同，可直接替换现有 DIP 8051，将系统由 8 位升级为 32 位
- 直接使用 USB 供电
- 内建五颗使用者自定义的 LED 及一个重置按钮
- 双列排针引出所有 I/O 脚位
- 包含 ICE 接口可连接 Nu-Link 进行刻录及除错
- 内建 ISP，仅需透过 UART 即可升级程序

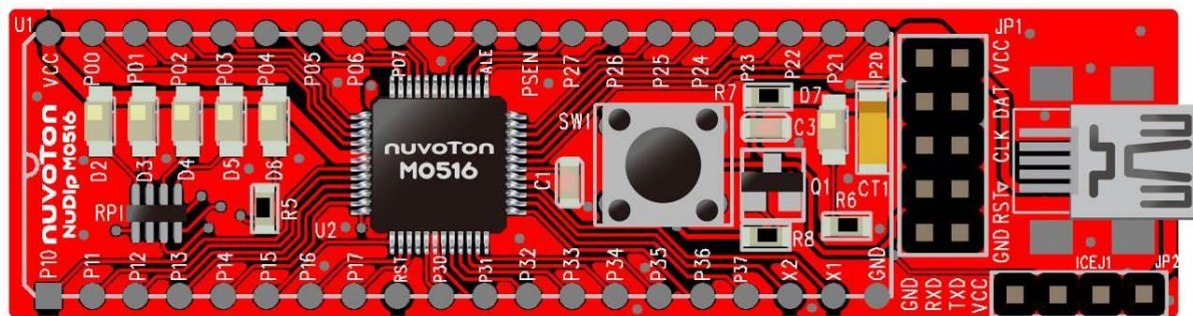


Figure 1-1 Nu-DIP-M0516

2 NU-DIP-M0516介绍

Figure 2-1 为 Nu-DIP-M0516硬件组成，所有组件皆环绕着M0516LDE设计，可直接使用USB供电，包含最低系统执行所需的组件，减少开发者周边电路的连接。

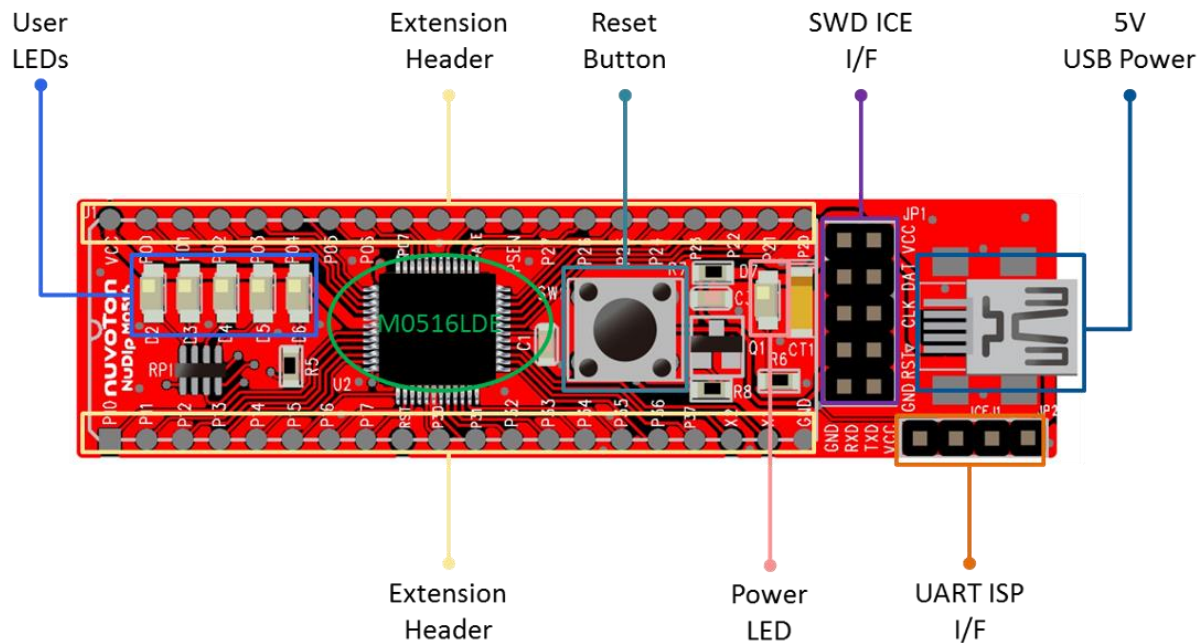


Figure 2-1 Nu-DIP-M0516硬件组成

2.1 M0516LDE Microcontroller

Nu-DIP-M0516核心转接板使用M0516LDE芯片，系统频率可达50MHz，带有64K Flash及4KB RAM，周边包含8个ADC通道、2个SPI、2个UART及2个I2C，具有工业规格的操作温度-40℃~ + 105℃与宽电压2.5V~5.5V等优越性能，如更多信息请参考M0516LDE数据手册。

2.2 USB Power

- ICEJ1: Nu-DIP-M0516 的 mini USB 接口，使用 USB 提供系统所需的 5V 电源。

2.3 UART ISP I/F

- JP2: UART ISP 接口，可连接 PC 透过 UART 进行刻录。脚位定义见 Table 2-1。

JP2	
Pin Number	Pin Name
1	VCC
2	P3.1(TXD)
3	P3.0(RXD)
4	GND

Table 2-1 UART ISP I/F

2.4 SWD ICE I/F

- JP1: ICE 接口，用来连接 Nu-Link 进行烧录或除错，脚位定义见 Table 2-2。

JP1			
Pin Number	Pin Name	Pin Number	Pin Name
1	NC	2	VCC
3	NC	4	ICEDAT
5	NC	6	ICECLK
7	NC	8	RESET#
9	NC	10	GND

Table 2-2 SWD ICE I/F

2.5 LEDs

- D2: 黄色 LED 预留给使用者定义，连接至 P4.0。
- D3: 绿色 LED 预留给使用者定义，连接至 P4.1。
- D4: 黄色 LED 预留给使用者定义，连接至 P4.2。
- D5: 绿色 LED 预留给使用者定义，连接至 P4.3。
- D6: 红色 LED 预留给使用者定义，连接至 P4.4。
- D7: 电源指示灯。

2.6 Reset Button

- SW1: Nu-DIP-M0516 重置按钮

2.7 Extension Header

- DIP-40: 引出所有 M0516LDE 脚位，详细请 Table 2-3。

DIP-40			
Pin Number	Pin Name	Pin Number	Pin Name
1	P1.0	21	P2.0
2	P1.1	22	P2.1
3	P1.2	23	P2.2
4	P1.3	24	P2.3
5	P1.4	25	P2.4
6	P1.5	26	P2.5
7	P1.6	27	P2.6

8	P1.7	28	P2.7
9	RESET	29	NC
10	P3.0	30	P4.5
11	P3.1	31	NC
12	P3.2	32	P0.7
13	P3.3	33	P0.6
14	P3.4	34	P0.5
15	P3.5	35	P0.4
16	P3.6	36	P0.3
17	P3.7	37	P0.2
18	X1	38	P0.1
19	X2	39	P0.0
20	VSS	40	VCC

Table 2-3 DIP-40

3 使用NU-DIP-M0516

3.1 系统要求

- Windows 系统
- Keil RVMDK(版本 4.50 以上)或 IAR EWARM(版本 6.5 以上)开发环境
- Nu-DIP-M0516 核心转接版

3.2 硬件配置

将Nu-DIP-M0516 USB插槽连接至计算机主机，Nu-DIP-M0516会依USB提供的5V电压做为系统电源，不须额外连接其他电源。

3.3 设定开发环境

- 安装 Keil μVision® IDE

请至Keil官方网站(<http://www.keil.com>)下载Keil μVision® IDE并安装

- 安装 Nu-Link 驱动程序

Step1	开启新唐网站(http://www.nuvoton.com)
Step2	 <p>The screenshot shows the Nuvoton website with the following navigation steps:</p> <ul style="list-style-type: none"> Step2-1 選擇Support: Click on the 'Support' link in the top navigation bar. Step2-2 點選Tool & Software: Click on the 'Tool & Software' link in the dropdown menu. <p>The 'M051 Base Series' list includes:</p> <ul style="list-style-type: none"> M0516LDE, M0516LDN, M0516ZDE, M0516ZDN, M052LDE, M052LDN, M052ZDE, M052ZDN, M054LDE, M054LDN, M054ZDE, M054ZDN, M058LDE, M058LDN, M058SFAN, M058SLAN, M058SSAN, M058SZAN, M058ZDE, M058ZDN <p>The 'M0518 Series' is also visible on the right side of the page.</p>

Step3

Development Tool Hardware

- Learning
- Product Related Information
- Brochures and Flyers
- Tool & Software
- Development Tool Hardware
- Development Kit
- Learning Board
- NuEdu-UNO
- Programmer
- Software**
- Third Party Tool
- Reference Design
- Third-Party Design
- FAQ
- Sales/ Technical Support
- Forum

Software

Nuvoton provides both hardware and software development tools to customers to shorten the product development time using Nuvoton NuMicro™ Family, 32-bit Cortex-M0/M4 Microcontrollers. The simple, easy-to-use and real-featured development system provides a quick and easy way for product development and debugging. With ISP, ICP, On-line/Off-line

Step4

Programmer Software Tools Package

File name	Description	Version	Date
ICP Programming Tool V1.30.6491.zip Revision History	NuMicro ICP tool & user manual	V1.30.6491	2015-8-24
ISP Programming Tool V1.47.zip Revision History	NuMicro ISP Programming Tool & user manual	V1.47	2015-7-28
NuGang Programmer V7.02.zip Revision History	NuGang Programmer software & user manual	V7.02	2015-11-27

Nu-Link Driver

File name	Description	Version	Date
Nu-Link Driver for Keil RVMDK V1.30.6491.zip Revision History	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.30.6491	2015-8-10
Nu-Link Driver for IAR EWARM V1.30.6491.zip Revision History	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.30.6491	2015-8-10

NuTool

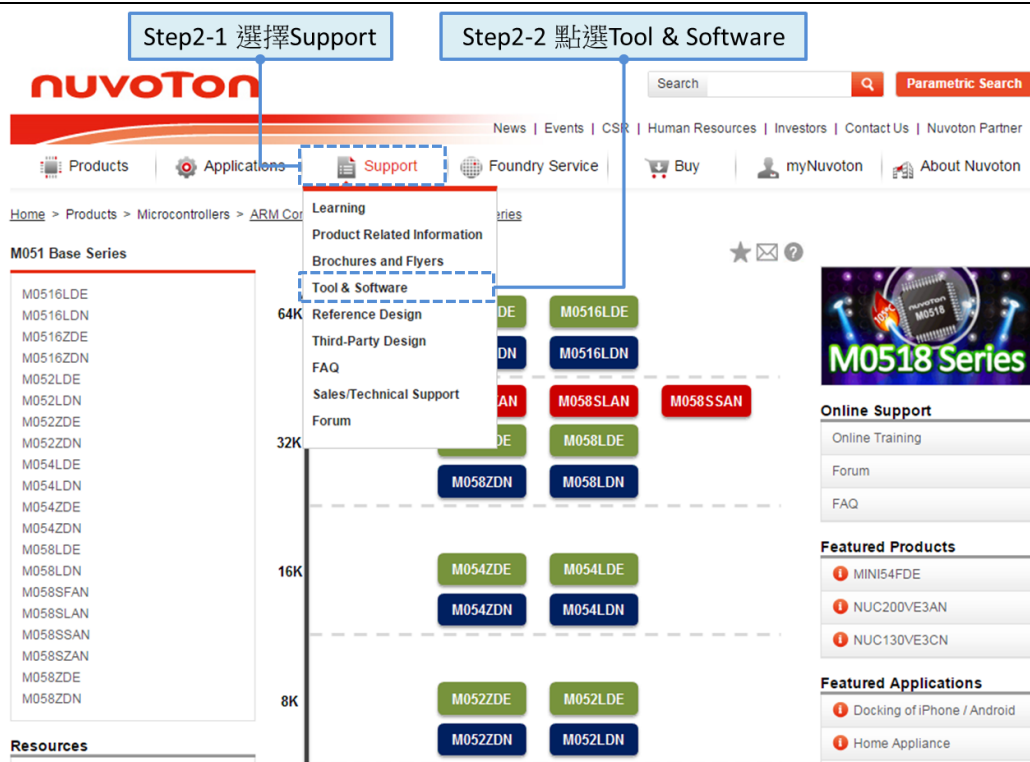
File name	Description	Version	Date
NuTool-PinConfig_Rev.1.05	PinConfigure is used to configure GPIO multi-functions of Nuvoton MCU families.	V1.05	2015-7-30

Step5	下载“Nu-Link Driver for Keil RVMDK”档案，下载完成后，解压缩文件案并执行“Nu-Link_Keil_Driver.exe”，依指示安装Nu-Link驱动程序。
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- 安装 M0516 BSP
请至新唐官方网站(<http://www.nuvoton.com>)，下载M0516 BSP包并安装。

3.4 使用ISP刻录

- 安装 NuMicro ISP Programming Tool

Step1	开启新唐网站(http://www.nuvoton.com)
Step2	 <p>The screenshot shows the Nuvoton website with the following navigation steps highlighted:</p> <ul style="list-style-type: none"> Step2-1 選擇Support: The 'Support' menu is selected in the top navigation bar. Step2-2 點選Tool & Software: The 'Tool & Software' option is selected in the dropdown menu. <p>The main content area shows the 'M051 Base Series' list on the left, with 'M0516LDE' and 'M0516LDN' highlighted in the main product grid. The right sidebar contains 'Online Support' and 'Featured Products' sections.</p>

Step3

Home > Support > Tool & Software > Development Tool Hardware

Development Tool Hardware

- Learning
- Product Related Information
- Brochures and Flyers
- Tool & Software
- Development Tool Hardware
- Development Kit
- Learning Board
- NuEdu-UNO
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Revision History			
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Revision History			

NuTool

File name	Description	Version	Date
NuTool-PinConfig_Rev.1.05	PinConfigure is used to configure GPIO multi-functions of Nuvoton MCU families.	V1.05	2015-7-30

Step5	下载"ISP Programming Tool"档案，完成后解压缩文件案依照指示安装"NuMicro ISP Programming Tool"。
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- 硬件连接

如Figure 3-1 连接Nu-DIP-M0516 ICEJ1的VCC(5V)、TX、RX、GND到计算机UART。

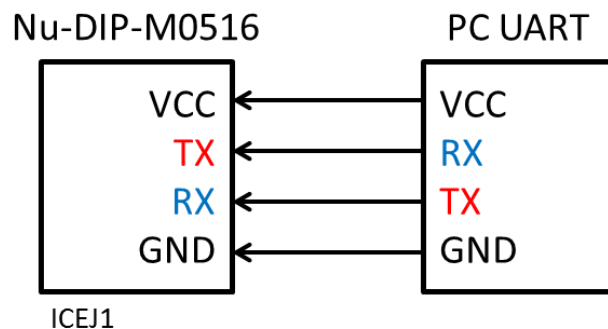


Figure 3-1 ISP连接示意图

- 启动 NuMicro ISP Programming Tool
- 选择 Connection type 为 COM 后选择 COM port 号码，如 Figure 3-2 ISP 刻录步骤方框 2。
- 点选 connect，如 Figure 3-2 方框 3。
- 按下 Nu-DIP-M0516 上的重置按钮
- 确定连接后，选择要更新的 APROM FW 档案，如 Figure 3-2 方框 4。
- 选择 Program 的区块为 APROM，如 Figure 3-2 方框 5。
- 点选 Start，如 Figure 3-2 方框 6。

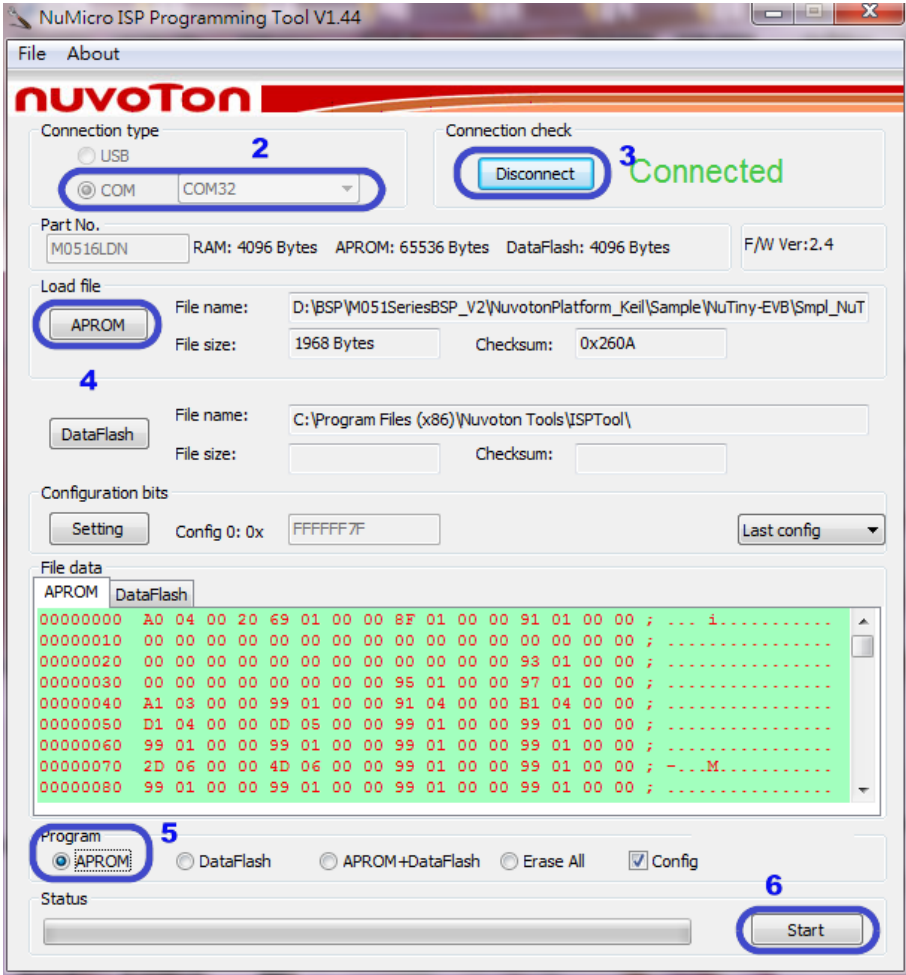


Figure 3-2 ISP刻录步骤

4 执行范例程序

此章节以Nu-DIP-M0516 BSP中的DancingLED为例，示范如何使用Keil μ Vision® IDE来执行范例程序。※范例程序路径Nuvoton_NU_DIP_M0516_BSP\SampleCode\NU-DIP-M0516。

4.1 硬件连接

依Figure 4-1 DancingLED硬件接线示意图，将Nu-DIP-M0516的P0.0-P0.7连接至面包版上的LED，并将Nu-DIP-M0516 JP3与Nu-Link连接，如Figure 4-2 Nu-Link连接示意图所示。

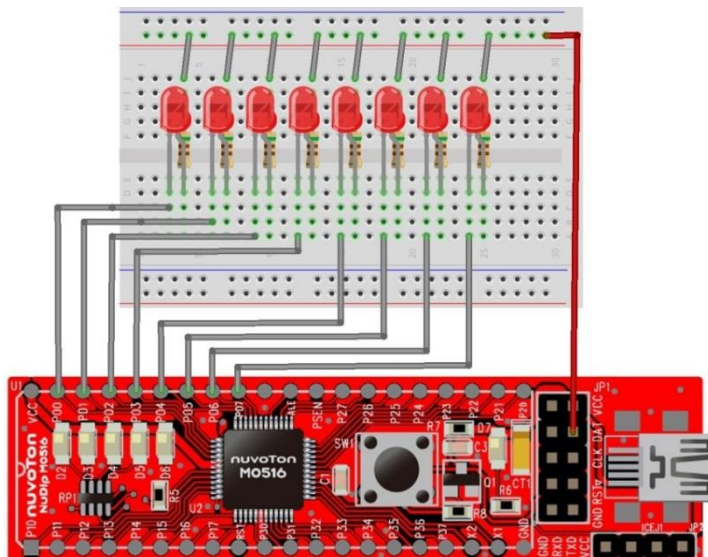


Figure 4-1 DancingLED硬件接线示意图



Figure 4-2 Nu-Link连接示意图

4.2 执行项目

开启DancingLED项目，项目路径如Figure 4-3所示。执行DancingLED范例后，可以看到面包版上的LED不停由右到左并由右至左不停的变动。

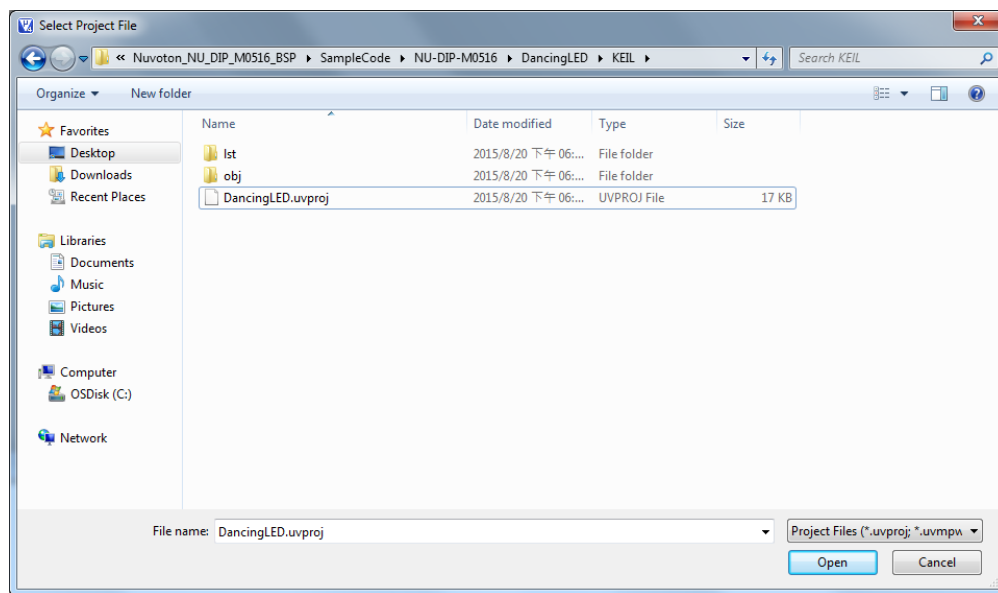










Figure 4-3 范例DancingLED路径

-  **Start µVision®**
- **Project-Open**
Open the DancingLED.uvproj project file
-  **Project - Build**
Compile and link the DancingLED application
-  **Flash – Download**
Program the application code into on-chip Flash ROM
-  **Start debug mode**
Using the debugger commands, you may:
 - ◆  Review variables in the watch window
 - ◆  Single step through code
 - ◆  Reset the device
 - ◆  Run the application

6 REVISION HISTORY

Date	Revision	Description
2015.12.22	1.00	1. Initially issued.

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