

**ULINK**  
在线仿真器&在线烧录器  
操作说明书

(简体版)

**Rev. 1.0**  
**September 2020**

目 录

目 录 .....	2
图目录.....	3
<b>1. ARM 系列 IC 之第三方工具 .....</b>	<b>4</b>
1.1 在线烧录器与在线仿真器---Keil ULINK 介绍.....	4
1.2 ULINK 系列仿真器--- ULINK2 介绍 .....	5
1.3 ULINK 系列仿真器--- ULINK2 连接方式.....	6
<b>2. 版本修改纪录.....</b>	<b>7</b>

图目录

Figure 1-1	ULINK 系列仿真器 .....	4
Figure 1-2	ULINK2 所支援的 2 种目标板(Target Board)连接器定义 .....	5
Figure 1-3	ULINK2 连接之示意图 .....	6
Figure 1-4	Keil MDK 所读到之正确 IDCODE .....	6

## 1. ARM 系列 IC 之第三方工具

### 1.1 在线烧录器与在线仿真器---Keil ULINK 介绍

Keil ULINK 系列仿真器是一款多功能之 ARM 仿真工具,可以透过 JTAG/SWD 界面连接至 ARM 系列 IC 之目标板(Target Board), 以进行烧录与仿真。

目前市面上能买到的 ULINK 系列仿真器有四种, 分别为 ULINKpro、ULINKpro D、ULINKplus、以及 ULINK2, 可至 Keil 官网(<http://www2.keil.com/mdk5/ulink>)或各大购物网站进行采购。

Figure 1-1 为市面上之四种 ULINK 系列之仿真器。





<b>ULINKpro: Debug, serial wire and streaming trace</b>													
	<table border="1"> <tbody> <tr> <td>JTAG</td> <td>Flash programming + run-control</td> </tr> <tr> <td>SWD</td> <td>Memory + breakpoint (access while running)</td> </tr> <tr> <td>SWO 100 Mbps</td> <td>Serial wire trace capturing up to <b>100 Mbit/sec</b> (Manchester mode)</td> </tr> <tr> <td>ETM Streaming</td> <td>50 MHz JTAG/SW clock speed</td> </tr> <tr> <td></td> <td>ETM trace capturing up to <b>800 Mbit/sec</b></td> </tr> <tr> <td></td> <td><b>Streaming trace:</b> Instruction trace, code coverage, performance analysis</td> </tr> </tbody> </table>	JTAG	Flash programming + run-control	SWD	Memory + breakpoint (access while running)	SWO 100 Mbps	Serial wire trace capturing up to <b>100 Mbit/sec</b> (Manchester mode)	ETM Streaming	50 MHz JTAG/SW clock speed		ETM trace capturing up to <b>800 Mbit/sec</b>		<b>Streaming trace:</b> Instruction trace, code coverage, performance analysis
JTAG	Flash programming + run-control												
SWD	Memory + breakpoint (access while running)												
SWO 100 Mbps	Serial wire trace capturing up to <b>100 Mbit/sec</b> (Manchester mode)												
ETM Streaming	50 MHz JTAG/SW clock speed												
	ETM trace capturing up to <b>800 Mbit/sec</b>												
	<b>Streaming trace:</b> Instruction trace, code coverage, performance analysis												
<b>ULINKpro D: Debug and fast serial wire trace</b>													
	<table border="1"> <tbody> <tr> <td>JTAG</td> <td>Flash programming + run-control</td> </tr> <tr> <td>SWD</td> <td>Memory + breakpoint (access while running)</td> </tr> <tr> <td>SWO 100 Mbps</td> <td>Serial wire trace capturing up to <b>100 Mbit/sec</b> (Manchester mode)</td> </tr> <tr> <td></td> <td>50 MHz JTAG/SW clock speed</td> </tr> </tbody> </table>	JTAG	Flash programming + run-control	SWD	Memory + breakpoint (access while running)	SWO 100 Mbps	Serial wire trace capturing up to <b>100 Mbit/sec</b> (Manchester mode)		50 MHz JTAG/SW clock speed				
JTAG	Flash programming + run-control												
SWD	Memory + breakpoint (access while running)												
SWO 100 Mbps	Serial wire trace capturing up to <b>100 Mbit/sec</b> (Manchester mode)												
	50 MHz JTAG/SW clock speed												
<b>ULINKplus: Debug, serial wire trace, test I/O, and power measurement</b>													
	<table border="1"> <tbody> <tr> <td>JTAG</td> <td>Flash programming + run-control</td> </tr> <tr> <td>SWD</td> <td>Memory + breakpoint (access while running)</td> </tr> <tr> <td>SWO 50 Mbps</td> <td>Serial wire trace capturing up to 50 Mbit/sec (UART mode)</td> </tr> <tr> <td>Power &amp; GPIO</td> <td>10 MHz JTAG/SW clock speed</td> </tr> <tr> <td></td> <td>Power measurement for efficient source code</td> </tr> <tr> <td></td> <td>I/Os for test automation and continuous integration</td> </tr> </tbody> </table>	JTAG	Flash programming + run-control	SWD	Memory + breakpoint (access while running)	SWO 50 Mbps	Serial wire trace capturing up to 50 Mbit/sec (UART mode)	Power & GPIO	10 MHz JTAG/SW clock speed		Power measurement for efficient source code		I/Os for test automation and continuous integration
JTAG	Flash programming + run-control												
SWD	Memory + breakpoint (access while running)												
SWO 50 Mbps	Serial wire trace capturing up to 50 Mbit/sec (UART mode)												
Power & GPIO	10 MHz JTAG/SW clock speed												
	Power measurement for efficient source code												
	I/Os for test automation and continuous integration												
<b>ULINK2: Debug and Serial Wire Trace</b>													
	<table border="1"> <tbody> <tr> <td>JTAG</td> <td>Flash programming + run-control</td> </tr> <tr> <td>SWD</td> <td>Memory + breakpoint (access while running)</td> </tr> <tr> <td>SWO 1 Mbps</td> <td>Serial wire trace capturing up to 1 Mbit/sec (UART mode)</td> </tr> <tr> <td></td> <td>10 MHz JTAG/SW clock speed</td> </tr> </tbody> </table>	JTAG	Flash programming + run-control	SWD	Memory + breakpoint (access while running)	SWO 1 Mbps	Serial wire trace capturing up to 1 Mbit/sec (UART mode)		10 MHz JTAG/SW clock speed				
JTAG	Flash programming + run-control												
SWD	Memory + breakpoint (access while running)												
SWO 1 Mbps	Serial wire trace capturing up to 1 Mbit/sec (UART mode)												
	10 MHz JTAG/SW clock speed												

Figure 1-1 ULINK 系列仿真器

## 1.2 ULINK 系列仿真器--- ULINK2 介绍

ULINK2 仿真器特性如下:

- JTAG 支援 ARM7, ARM9, 8051, C166, 与所有 Cortex-M 之处理器
- SWD/SWV 支援所有的 Cortex-M 之处理器
- 支援程式码下载烧录与仿真(支援多个断点设置)
- 支援记忆体与暂存器之检视与修改
- 工作电压支援: 2.7V~5.5V
- 透过 USB 2.0 界面与电脑进行连接与通讯
- 支援 2 种目标板(Target Board)连接器:
  - 10-pin (0.05") – Cortex Debug Connector
  - 20-pin (0.10") – ARM Standard JTAGE Connector

Figure 1-2 为 ULINK2 所支援的 2 种目标板(Target Board)连接器定义

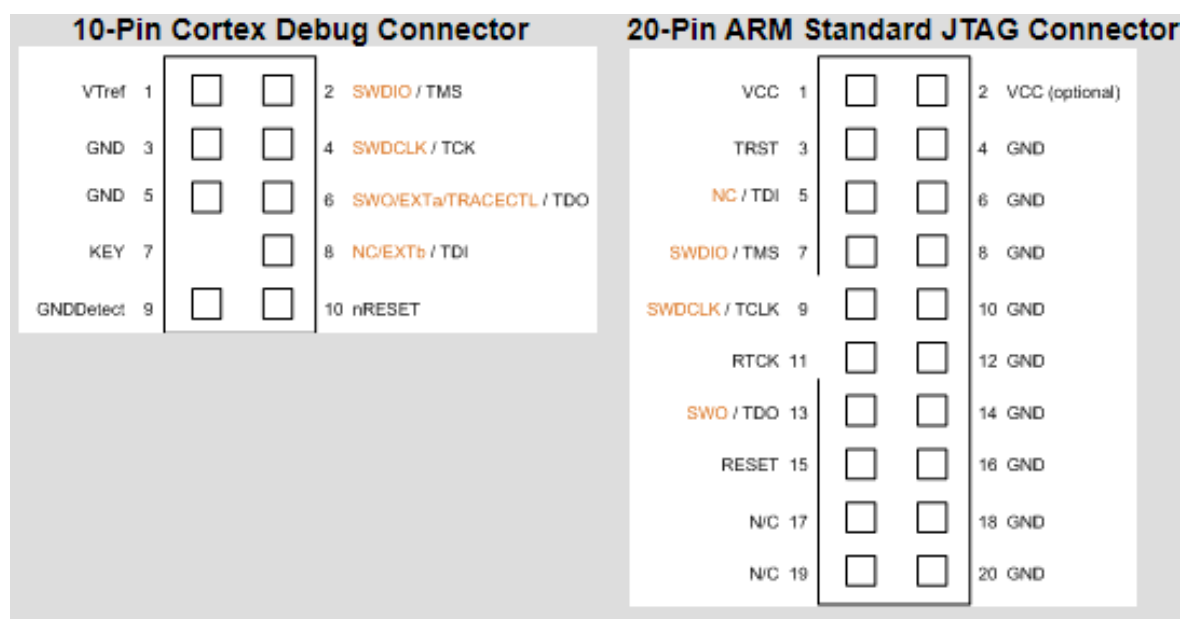


Figure 1-2 ULINK2 所支援的 2 种目标板(Target Board)连接器定义

### 1.3 ULINK 系列仿真器--- ULINK2 连接方式

ULINK2 使用前需正确连接系统与目标板方能正常工作:

- 将 ULINK2 之 USB 口连接至电脑
- 将 ULINK2 之 JTAG/SWD 界面连接至目标板(Target Board)
- 可于电脑端开启 Keil MDK 开发工具来确认连接是否正常

Figure 1-23 为 ULINK2 连接之示意图



Figure 1-3 ULINK2 连接之示意图

Figure 1-4 当连接正确时可于 Keil MDK 中读到正确的 IDCODE

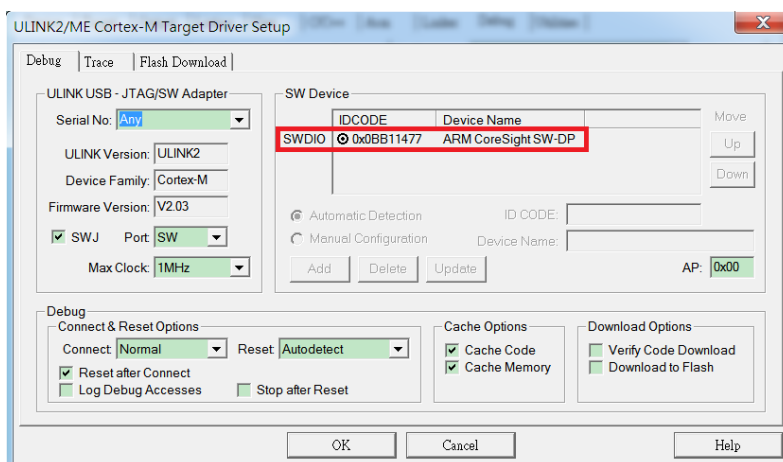


Figure 1-4 Keil MDK 所读到之正确 IDCODE

## 2. 版本修改纪录

版本	纪录	日期
1.0	初版完成	2020/09/14