



# Gowin\_EMPU\_M1 Serial Debug Reference Manual

IPUG535-1.8E,07/16/2021

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## Revision History

Date	Version	Description
02/19/2019	1.0E	Initial version published.
07/18/2019	1.1E	MCU hardware design and software programming design support extended peripherals: CAN, Ethernet, SPI-Flash, RTC, DualTimer, TRNG, I <sup>2</sup> C, SPI, SD-Card.
08/18/2019	1.2E	<ul style="list-style-type: none"> <li>● MCU hardware design and software programming design support extended peripheral: DDR3 Memory;</li> <li>● Fixed known issues of ITCM, DTCM Size and IDE.</li> </ul>
09/27/2019	1.3E	<ul style="list-style-type: none"> <li>● MCU hardware design and software programming design support read, write and erasure of SPI-Flash;</li> <li>● MCU software programming design supports a continuous multi-byte read and write of I<sup>2</sup>C;</li> <li>● Fixed known issues of address mapping of AHB2 and APB2 extended interface in MCU software programming design;</li> <li>● Fixed known issues of continuous read and write of DDR3 Memory in MCU software programming design.</li> </ul>
12/06/2019	1.4E	<ul style="list-style-type: none"> <li>● MCU hardware design and software programming design supports PSRAM;</li> <li>● MCU compiling software GMD V1.0 updated;</li> <li>● RTOS reference design updated;</li> <li>● Hardware and software reference design of AHB2 and APB2 extension bus interface added.</li> </ul>
03/06/2020	1.5E	Updated the version of software.
06/12/2020	1.6E	<ul style="list-style-type: none"> <li>● MCU supports for external instruction memory;</li> <li>● MCU supports for external data memory;</li> <li>● Extension of 6 AHB bus interfaces;</li> <li>● Extension of 16 APB bus interfaces;</li> <li>● GPIO supports multiple interface types;</li> <li>● I<sup>2</sup>C supports multiple interface types.</li> </ul>
01/25/2021	1.7E	<ul style="list-style-type: none"> <li>● The reference design of GW1N-9C, GW2A-18C and GW2A-55C (Version C) updated;</li> <li>● The reference design of Gowin Software updated.</li> </ul>
07/16/2021	1.8E	<ul style="list-style-type: none"> <li>● The version of FPGA and MCU updated.</li> </ul>

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# 1 Overview

Gowin\_EMPU\_M1 supports serial port debug. The master communicates with the slave by serial ports. Serial debugging assistant software is used to trace the debugging information on the PC side.

# 2 Hardware Resource

- DK-START-GW2A18 V2.0
  - GW2A-LV18PG256C8/I7
  - GW2A-18C (Version C)
- USB to serial port interface board
- PC Computer



# 3 Software Resource

- Gowin\_V1.9.8 Beta and above
- ARM Keil MDK (V5.26 and above) or GOWIN MCU Designer (V1.1 and above)
- Serial Debugging Assistant Software

# 4 Reference Design

Gowin\_EMPU\_M1 supports serial debug reference design in ARM Keil MDK (V5.26 and above) and GOWIN MCU Designer (V1.1 and above) software environment. Get following reference designs by the link:

[http://cdn.gowinsemi.com.cn/Gowin\\_EMPU\\_M1.zip](http://cdn.gowinsemi.com.cn/Gowin_EMPU_M1.zip)

- Gowin\_EMPU\_M1\ref\_design\MCU\_RefDesign\Keil\_RefDesign\uart
- Gowin\_EMPU\_M1\ref\_design\MCU\_RefDesign\GMD\_RefDesign\cm1\_uart

# 5 Debug Flow

## 5.1 Hardware Design

### 5.1.1 Hardware Design

1. Open the IP Core Generator tool of Gowin Software and select "Soft IP Core > Micorprocessor System > Soft-Core-MCU > Gowin\_EMPU\_M1";
2. Configure Cortex-M1 and APB Bus Peripherals, select UART0 or UART1, and generate Gowin\_EMPU\_M1 hardware design with UART function;
3. Instantiate Gowin\_EMPU\_M1 Top Module, import user designs, and connect ports between user design and Gowin\_EMPU\_M1 Top Module;
4. Or use Gowin\_EMPU\_M1 reference design:  
Gowin\_EMPU\_M1\ref\_design\FPGA\_RefDesign\Debug\_RefDesign or NoDebug\_RefDesign

### 5.1.2 Physical Constraints

Constrain the UART0 and UART1 ports in Gowin\_EMPU\_M1 to FPGA IO.

## 5.2 Software Programming Design

Please refer to [4](#) Reference Design  
Gowin\_EMPU\_M1\ref\_design\MCU\_RefDesign\Keil\_RefDesign\uart or  
GMD\_RefDesign\cm1\_uart

## 5.3 Board Level Connection

Take development board reference design of DK-START-GW2A18 V2.0 in SDK for an instance.

Connect Gowin DK-START-GW2A18 V2.0 to USB to serial port board using jumper. The UART0 and UART1 ports connection in Reference Design is as shown in Table 5-1.

**Table 5-1 UART0/1 Port Constraint**

UART	Ports	IO
UART0	RXD	M14
	TXD	K12
UART1	RXD	J13
	TXD	H13

## 5.4 Serial Debug Assistant

Open the serial debugging assistant software, as shown in Figure 5-1.

1. Refer to the PC device manager to select a proper communication port.
2. Configure serial port attributes, such as the reference design in SDK:
  - Serial port baud rate: 115200
  - Stop bit: 1
  - Data bit: 8
  - Parity bit: None
3. Open the serial port.
4. Power on the development board.
5. Send and receive the debugging information.

**Figure 5-1 Serial Debugging Assistant Software**



