



Gowin_EMPU_M1 Serial Debug Reference Manual

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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 ² C, SPI, SD-Card.
08/18/2019	1.2E	● MCU hardware design and software programming design support extended peripheral: DDR3 Memory. ● Fixed known issues of ITCM, DTCM Size and IDE.
09/27/2019	1.3E	● MCU hardware design and software programming design support read, write and erasure of SPI-Flash. ● MCU software programming design supports a continuous multi-byte read and write of I²C. ● Fixed known issues of address mapping of AHB2 and APB2 extended interface in MCU software programming design. ● Fixed known issues of continuous read and write of DDR3 Memory in MCU software programming design.
12/06/2019	1.4E	● MCU hardware design and software programming design supports PSRAM. ● MCU compiling software GMD V1.0 updated. ● RTOS reference design updated. ● Hardware and software reference design of AHB2 and APB2 extension bus interface added.
03/06/2020	1.5E	Software version updated.
06/12/2020	1.6E	● MCU supports external instruction memory. ● MCU supports external data memory. ● Extension of 6 AHB bus interfaces. ● Extension of 16 APB bus interfaces. ● GPIO supports multiple interface types. ● I²C supports multiple interface types.
01/25/2021	1.7E	● The reference design of GW1N-9C, GW2A-18C and GW2A-55C (Version C) updated. ● The reference design of Gowin Software updated.
07/16/2021	1.8E	● The version of FPGA and MCU updated.
10/12/2021	1.9E	FPGA software version updated.



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1 Overview

Gowin_EMPU_M1 supports serial port debug. The master communicates with the slave via a serial port. Serial debug assistant software is used to trace the debug 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



3 Software Resource

- Gowin_V1.9.8.01 and above
- ARM Keil MDK (V5.26 and above) or GOWIN MCU Designer (V1.1 and above)
- Serial Debug 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

- 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	Port	IO
UART0	RXD	M14
	TXD	K12
UART1	RXD	J13
	TXD	H13

5.4 Serial Debug Assistant

Open the serial debug 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. Development board power on
5. Send and receive the debug information.

Figure 5-1 Serial Debugging Assistant Software

