Gowin_EMPU_M1 Serial Debug
Reference Manual

IPUG535-2.4E,01/17/2025

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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 I^{2}C. ● 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. ● I^{2}C supports multiple interface types.
01/25/2021	1.7E	● The reference design of GW1N-9, GW2A-18 and GW2A-55 Version C updated. ● Gowin Software version updated.
07/16/2021	1.8E	The FPGA and MCU software version updated.
10/12/2021	1.9E	FPGA software version updated.
05/11/2023	2.0E	● Software version updated. ● Software programming reference design updated.
07/21/2023	2.1E	Tested software version updated.
03/07/2024	2.2E	Reference example for serial debug updated.
07/12/2024	2.3E	Reference example for serial debug updated.
01/17/2025	2.4E	● Tested software version updated. ● Reference example for serial debug 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.

2 Hardware Resource

- DK_START_GW5A-LV25UG324 V2.0
  - GW5A-LV25UG324C2/I1
  - GW5A-25 (Version A)
- USB to serial port interface board
- PC

3 Software Resource

- Tested software version: Gowin_V1.9.11 (64-bit)
- ARM Keil MDK (tested software version V5.26) or GMD (tested software version V1.2)
- Serial Debug Assistant Software

4 Reference Design

Gowin_EMPU_M1 supports serial debug reference design in ARM Keil MDK (tested software version V5.26) and GMD (tested software version V1.2) software environment. Get following reference designs by clicking this link:

- …\ref_design\MCU_RefDesign\MDK_RefDesign\cm1_demo\project\printf
- …\ref_design\MCU_RefDesign\GMD_RefDesign\cm1_demo\src\project\printf

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 2.1".
2. Configure Cortex-M1 core 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 design, and connect ports between user design and Gowin_EMPU_M1 Top Module.
4. Or use Gowin_EMPU_M1 reference design: …\ref_design\FPGA_RefDesign

5.1.2 Physical Constraints

Constrain the ports of UART0 or UART1 in Gowin_EMPU_M1 to the FPGA IO ports.

5.2 Software Programming Design

See chapter 4 Reference Design.

5.3 Board Level Connection

Use DK_START_GW5A-LV25UG324 V2.0 development board reference design for an instance.

Connect Gowin DK_START_GW5A-LV25UG324 V2.0 to USB to serial port board using DuPont cable. The UART0 ports connection in Reference Design is as shown in Table 5-1.

Table 5-1 UART0 Port Constraint

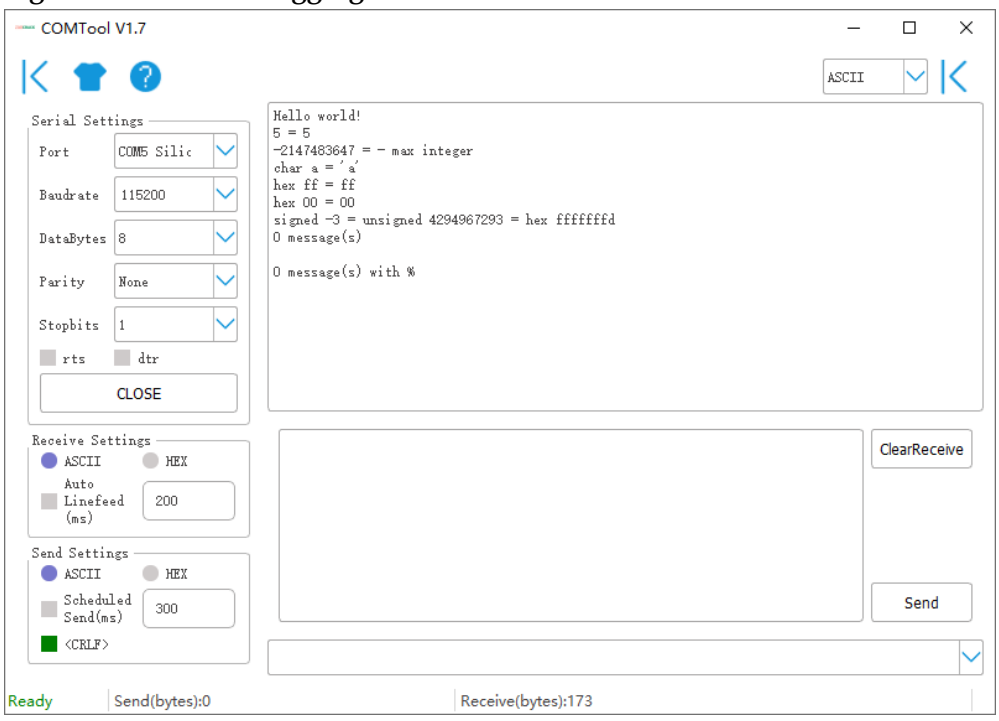
UART	Port	IO	On-board
UART0	TXD	P1	J2-1
	RXD	P2	J2-2

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:
   - 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

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