UBRG

Debug Adapter

USER'S GUIDE

Doc. Version 1.2

ELAN MICROELECTRONICS CORP.

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User's Guide Revision History

Doc. Version	Revision Description	Date
1.0	User's Guide Initial Release Version	2014/04/03
1.1	Modified the description about Selecting the ICE Interface Setting Modified Section 2.2.5 description Modified Figure 2-9 Power Monitor Voltage Setting	2014/04/15
1.2	Added three description items in Section 2.2.5	2016/01/28

Chapter 1
UBRG Hardware Description

1.1 Introduction

UBRG is an ICE tool that is dedicated to communicate to the target IC device with built-in On-Chip Debug System (OCDS). UBRG makes debug operations with only two signal lines (DATA, CLK), and is capable of supplying voltage to the target board. The UBRG is not a production programmer. It should be used for development purposes only.

1.2 UBRG Features

- Supports voltage range from 2.5V to 5.0V
- Monitors voltage fluctuation
- Diagnostic LEDs (active, state, power)
- Firmware update

1.3 UBRG In-Circuit Debugger

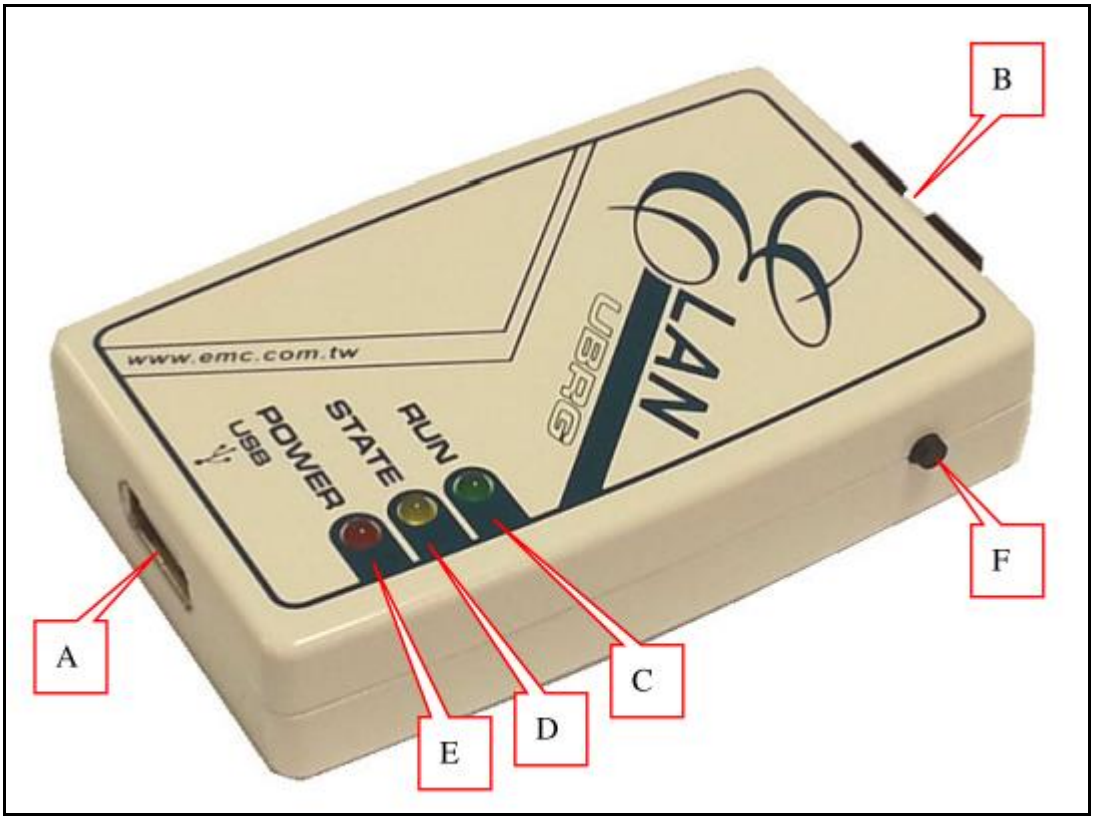

Figure 1-1 UBRG In-Circuit Debugger and its Major Components

A	USB Type A connector (this port can be connected to the PC)
B	Connects to the target board with built-in OCDS
C	Green data link LED indicator
D	Yellow power source LED indicator. When the LED brightens, it indicates that UBRG is supplying power to the target board from the POWER pin.
E	Red system power LED indicator
F	Reserve

1.3.1 UBRG Pin Definition

Figure 1-2 UBRG Pins

Pin	Name	Pin	Name
1	TCK	2	GND
3	Reserved	4	POWER
5	TMS	6	Reserved
7	TDO	8	2W_SCL
9	TDI	10	2W_SDA

OCD interface for 4-wire:

1: TCK **5:** TMS **7:** TDO **9:** TDI

OCD interface for 2-wire:

8: 2W_SCL **10:** 2W_SDA

Notes:

1. UBRG can supply voltage from 2.5 to 5.0V, but the maximum supply voltage is between 4.5 and 4.75V depending on load current conditions.
   - 4.50V / I_{load} = 100 mA
   - 4.75V / I_{load} = 10 mA
2. The maximum output current is 100 mA
3. The length of the cable connecting to the target board must be less than 10 cm.
4. The USB cable specifications are:
   - USB cable must be less than 180 cm
   - Wire spec.: 28AWG/1P, 24AWG/2C
   - Gold-plated

Chapter 2
System Installation

2.1 UBRG to Target Device Communication

2.1.1 Standard Debugger System – Target Board

Connect the USB cable and the Flat-Cable, and make sure that the UBRG system power LED is turned-on.

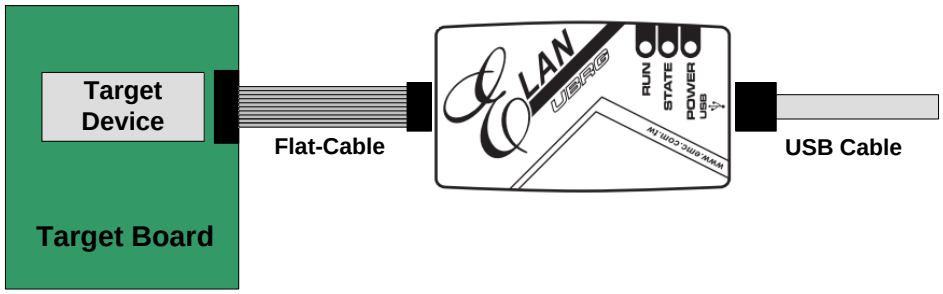

Figure 2-1 Connecting the Standard Debugger System to the Target Board

2.1.2 Circuit Components Restriction

The OCD pins with some components will prevent the debug function, because they will prevent fast transitions on the data and clock pins during debug communications, so some guidelines must be followed.

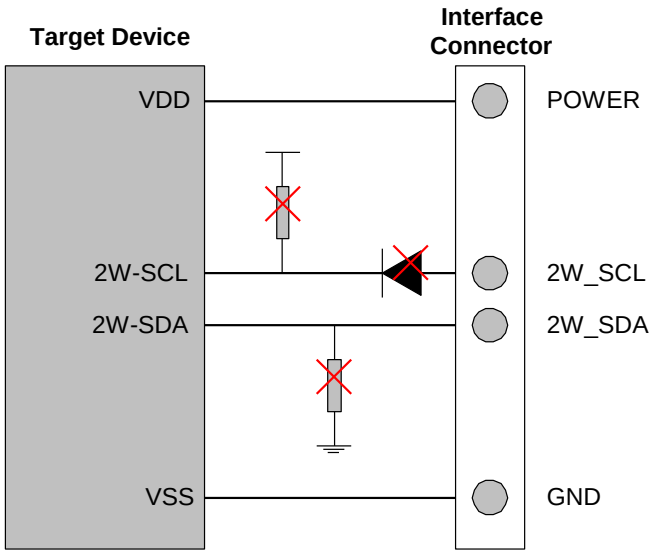

Figure 2-2 Diagram showing Circuit Components Restrictions

The following are some guidelines to follow to ensure efficient debugging:

- Do not use pull-high and pull-down on the 2W_SCL/2W_SDA pin.
- Do not use capacitors on the 2W_SCL/2W_SDA pin.
- Do not use diodes on the 2W_SCL/2W_SDA pin.

2.1.3 Debugging Interface for 4-wire

When the OCD interface configuration is 4-wire interface, it needs four signal wires (not including power and ground wires). The corresponding signal wires are shown in Figure 2-3.

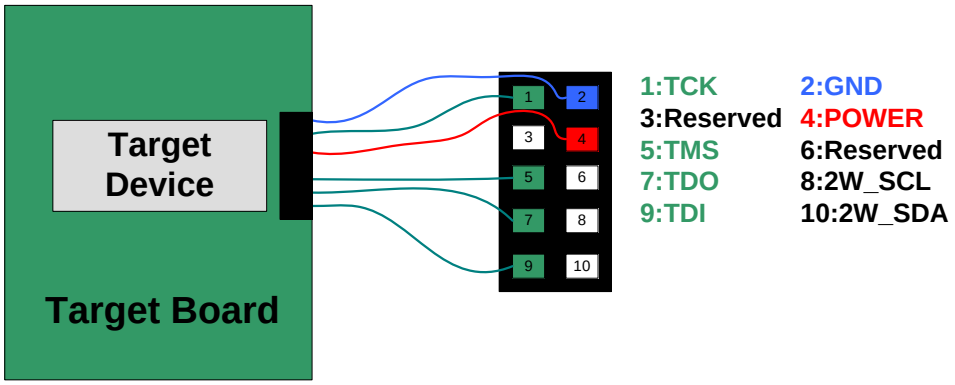

Figure 2-3 Debug Interface for 4-Wire

2.1.4 Debugging Interface for 2-wire

When the OCD interface configuration is 2-wire interface, it only needs two signal wires (not including power and ground wires). The corresponding signal wires are shown in Figure 2-4.

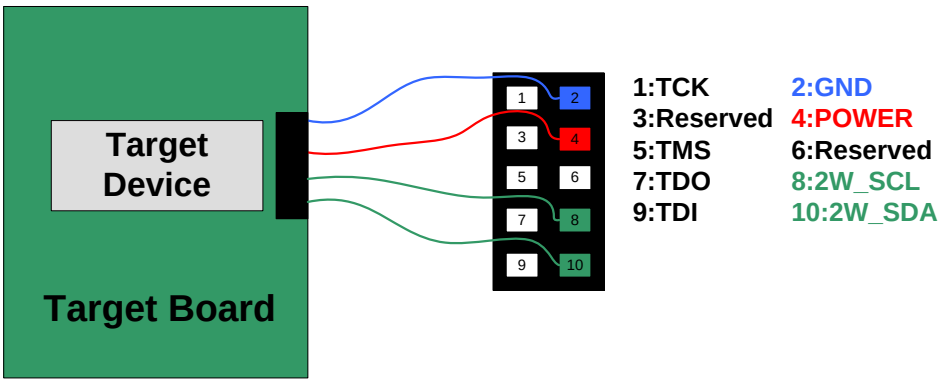

Figure 2-4 Debug Interface for 2-Wire

2.2 Connection to the UBRG and Power Setting

2.2.1 Selecting the ICE Interface Setting

If the target device supports two debugging interface, user can select one by choosing from the ICE Interface setting window on IDE.

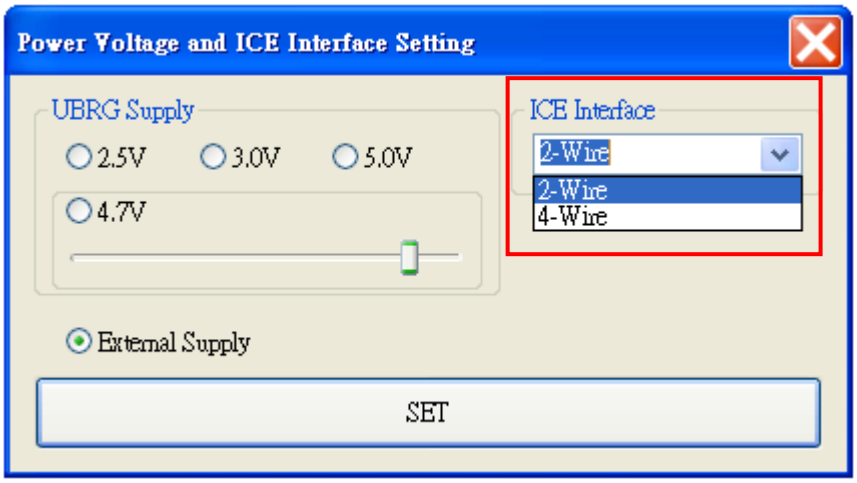

Figure 2-5 Selecting a Debugger Interface on the ICE Interface Setting Window

2.2.2 Selecting the UBRG Power Supply

When selecting UBRG Supply, the UBRG can supply voltage from 2.5 to 5.0V and user can shift the voltage bar to fine-tune the voltage. When clicking the [SET] button on the power voltage setting window, make sure that the UBRG STATE LED is turned-on.

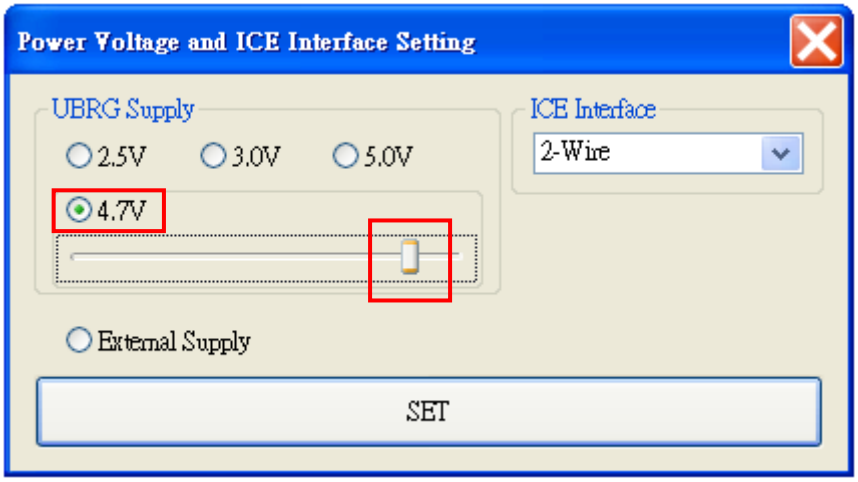

Figure 2-6 Selecting UBRG Supply on the Power Voltage Setting Window

NOTE

When UBRG supplies power to the Target Board, the maximum capacitance on the VDD pin is restricted to less than 330 µf.

When [UBRG Supply] is selected, it means that UBRG supplies power to the target board. If there is still an external power supply in the target board, an error message will pop up as shown below. However, if debugging is still required, the external power must be removed.

Figure 2-7 External Power Source Error Message

2.2.3 Selecting External Supply

UBRG supplies power to the target board and the maximum current consumption is 100 mA. When the power consumption of the target board exceeds 100 mA, it's a must to select [External Supply] on the Power Voltage setting window.

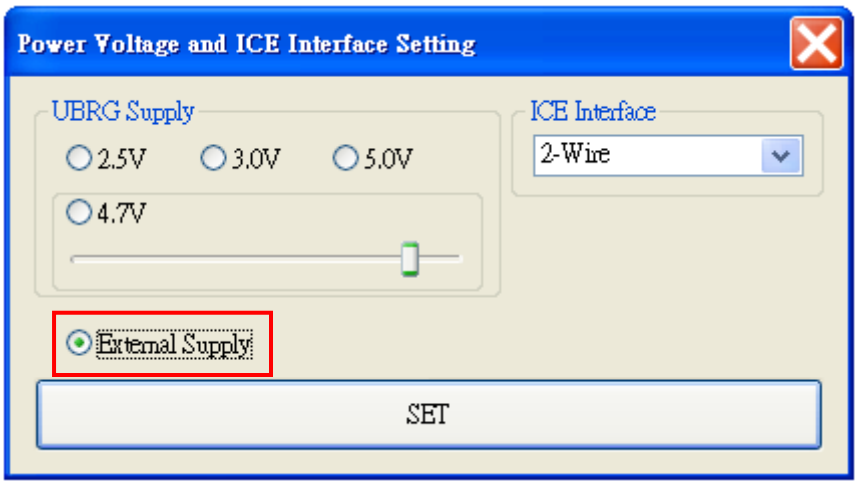

Figure 2-8 Selecting External Supply on the Power Voltage Setting Window

2.2.4 Power Monitor

The IDE provides a power monitoring function, which will ensure that the operation voltage does not exceed the range when user sets the voltage.

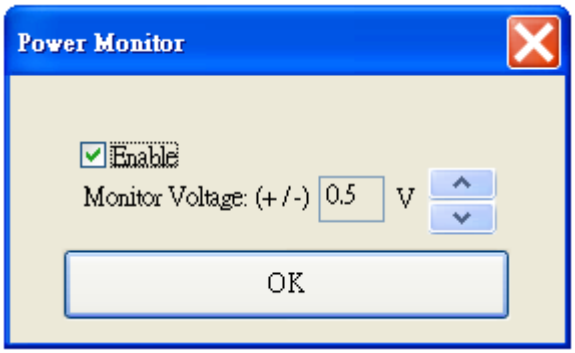

Figure 2-9 Power Monitor Voltage Setting

When the system voltage is fluctuating and results in overvoltage, i.e. exceeding the voltage range as per user's setting in the Power Monitor, an error message will pop up as shown below. Check and eliminate system power malfunctions.

Figure 2-10 Overvoltage Error Message

2.2.5 Restrictions on the OCD Pin

1. It is the objective to successfully set the [UBRG Supply] connection to OCDS. But since the maximum supply current from UBRG is 100mA, it is recommended to use external power to supply to the target device when the operating current needs more than 100mA. Hence, the share-function of OCD must only be input, so as to allow successful connection to OCDS.

2. The 2W_SCL pin is the OCD clock signal and the 2W_SDA pin is the OCD data signal. When UBRG is connected to the target board, the pin-shared function of 2W_SCL/2W_SDA becomes invalid on the target device.

3. User needs to ensure that 2W_SCL/2W_SDA is input only if External Supply is selected for UBRG power, otherwise connection to the target board may fail.