



eLR100-UL-EB

Manual

eLR100-UL-EB

Powered by MS500

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1. INTRODUCTION

eLR100-EVB 은 LoRa Module eLR100-UL-00 을 이용한 개발을 쉽게 하기 위해 제작된 Evaluation Board 입니다.

1.1. FEATURES

- eLR100-US/HF Module include
 - eWBM ultra low power advanced security MCU MS500
 - ✓ Cortex M0
 - ✓ Hardware Security system.
 - Semtech SX1272 radio transceiver supporting LoRa
 - UART Communication Interface
 - ✓ AT-Command set support for LoRaWAN
- SMA connector

1.2. BLOCK DIAGRAM

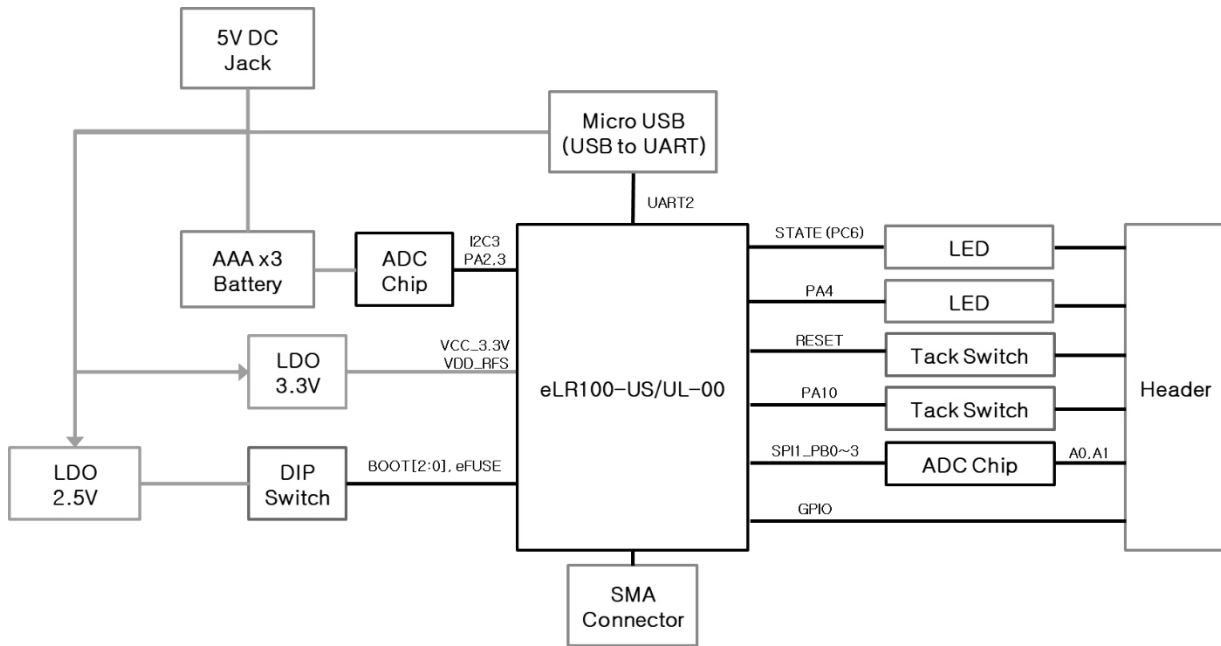


Figure 1 Hardware Block Diagram

2. SYSTEM DESCRIPTION

2.1. PART DESCRIPTION

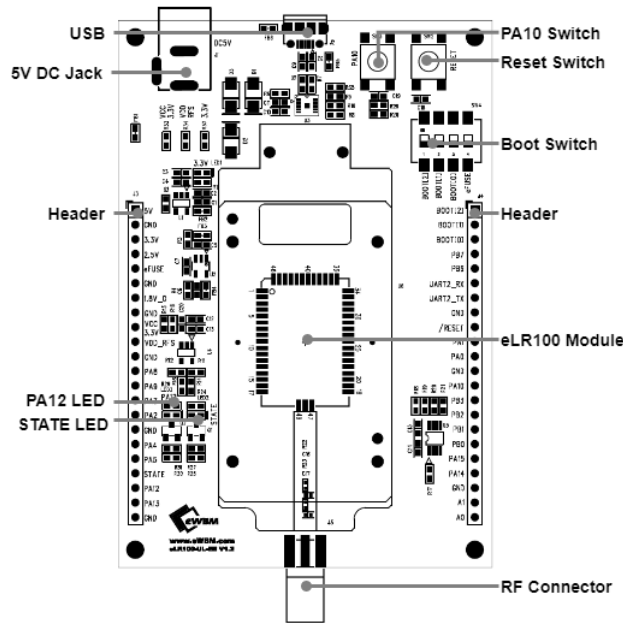


Figure 2 eLR100-UL-EB Parts

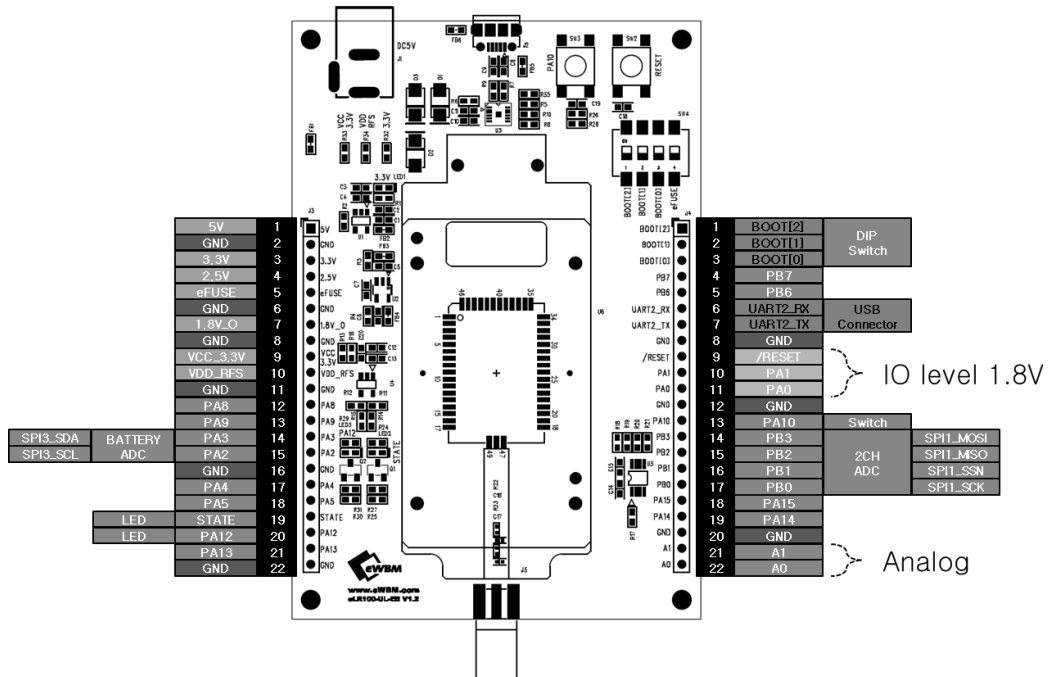


Figure 3 eLR100-EB Header J3,4 pinout diagram

2.2. POWER

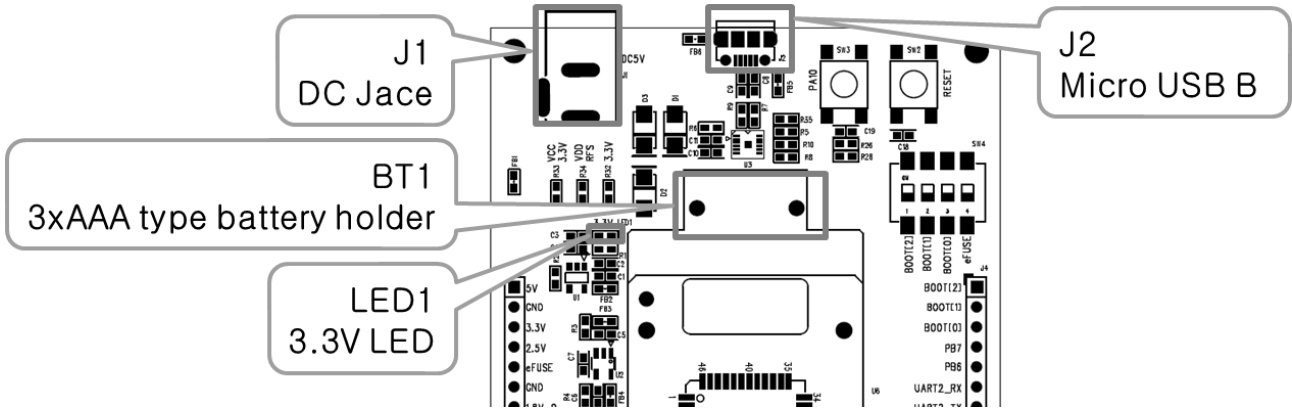


Figure 4 Input Power, Power LED

2.2.1. Input Power

전원은 Battery(BT1), DC Jack(J1), USB Connector(J2)를 통해서 입력된다.

Table 1. Input Power

Input	Battery	DC Jack	USB Connector
Reference	BT1	J1	J2
Connector	AAA 3EA Holder	DC 5V 2.0 pi	Micro USB B Type

2.2.2. Power LED (LED1)

입력전원을 통해 전원을 입력 받고, Board 회로를 통해 3.3V 전원이 생성이 되면 LED가 ON 됩니다.

2.3. RESET

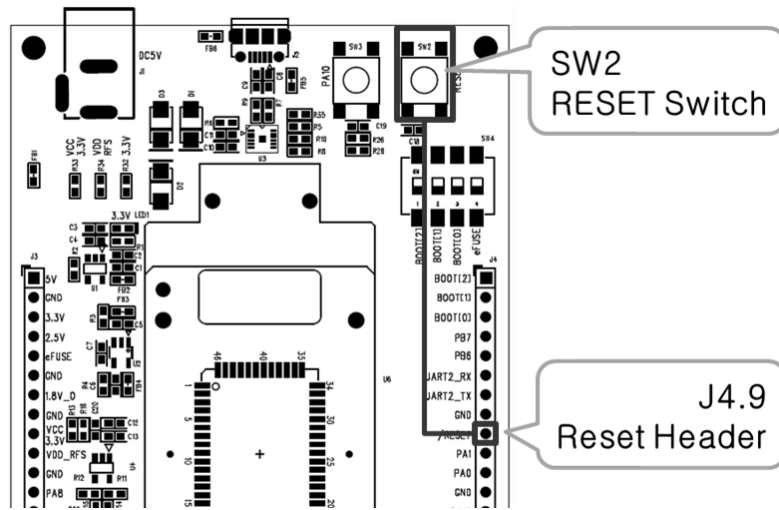


Figure 5 Reset Header, Switch

2.3.1. Reset Switch (SW2), Reset Header (J4.9)

- RESET 의 IO Level 은 1.8V 입니다.
- Module 내부에 1.8V Pull UP 회로가 구성되어 있습니다
- Host Board 제어시에는 기본값은 Input 으로 설정하며, Reset 시에는 High 를 1ms 유지 후에 기본값 Input 으로 설정합니다.

Example Code

```
pinMode(8,INPUT);
pinMode(8,OUTPUT);
digitalWrite(8, LOW);
delay(1);
pinMode(8,INPUT);
```

2.3.2. Software Reset (AT Command)

AT+Command 'AT+RESET' 를 이용해서 Reset 이 가능합니다.

자세한 내용은 AT+Command_Manual 을 참고합니다

2.4. BOOT

2.4.1. Boot Mode / eFuse

Boot Mode/eFuse Setting Switch (SW4)를 통해서 Boot Mode, eFuse 설정이 가능합니다.

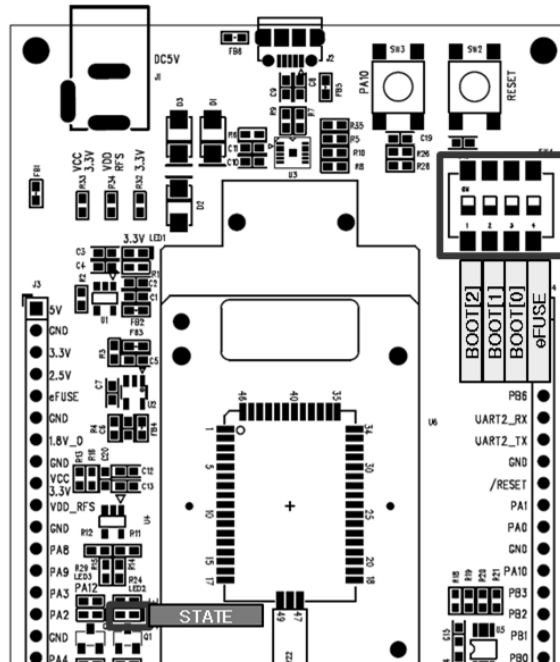


Figure 6 Boot Mode Setting

Table 2. Boot Mode Table

BOOT MODE	BOOT[2]	BOOT[1]	BOOT[0]	eFUSE
ROM BOOT (Default)	OFF 0	OFF 0	OFF 0	OFF 0
UART-Flash Update (Firmware Update)	OFF 0	ON 1	OFF 0	OFF 0
eFUSE Data Mode	OFF 0	OFF 0	ON 1	ON 1

2.4.2. STATE LED (LED 2)

LoRa Module 이 정상적으로 Booting 이 된다면 LED2 가 점등됩니다.

2.5. UART

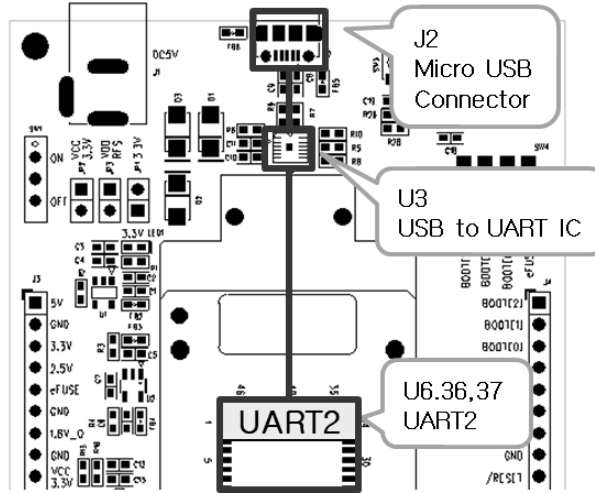


Figure 7 Arduino Type Header Description

2.5.1. UART 2

LoRa Module (eLR100-US/UL) 제품의 UART2 를 USB Connector(J2)를 통해서 통신이 가능합니다.

Firmware Update, AT+Command 기능이 가능합니다.

AT Command Setting

- Boot Mode Setting
 - ROM Boot Mode (BOOT [2:0] = 3'b000)
- Serial Port Setup

Port Setup Information	
Baud Rate	115200
Data	8 bit
Parity	None
Stop	1 bit
Flow Control	None

Firmware Update Mode Setting

- Boot Mode Setting
 - UART-Flash Update Mode (BOOT [2:0] = 3'b010)
- Serial Port Setup
 - Firmware Updater Setting [참고](#)

2.6. OPTIONAL PART

2.6.1. Battery Check

입력전원을 Battery로 사용하는 경우 Battery의 전압을 측정할 수 있습니다.

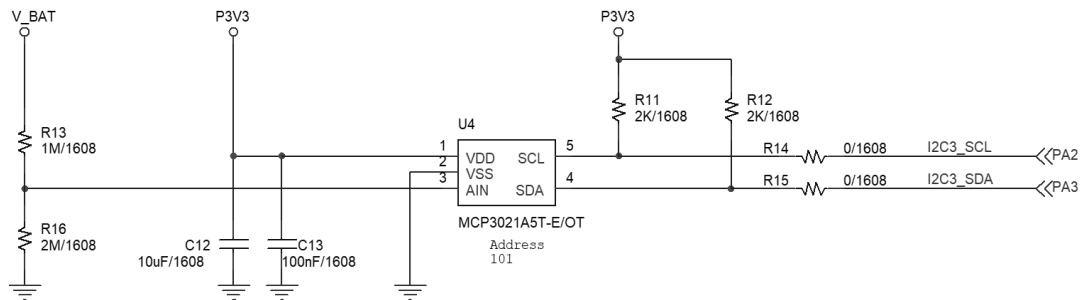


Figure 8 Battery Supply Circuit

- V_BAT 최대 입력전압: 4.9V
- ADC Converter Chip: MCP3021A5T-E/OT
 - Interface: I2C3(PA2,3)
 - ✓ 400kHz Fast Mode
 - Resolution: 10-bit
 - Standby Current: 5 nA typical, 1 μ A maximum
 - Address: 101

2.6.2. ADC

LoRa Module 의 SPI 을 이용하여 2 채널(A0, A1)의 ADC 를 사용할 수 있습니다.

- Dual Channel ADC Converter Chip
 - Interface: SPI1(PB0,1,2,3)
 - ✓ 1MHz Less
 - Resolution: 10-bit
 - Standby Current:5 nA typical, 2 μ A maximum
- Analog Input Channel Locations
 - A0: J4.22
 - A1: J4.21

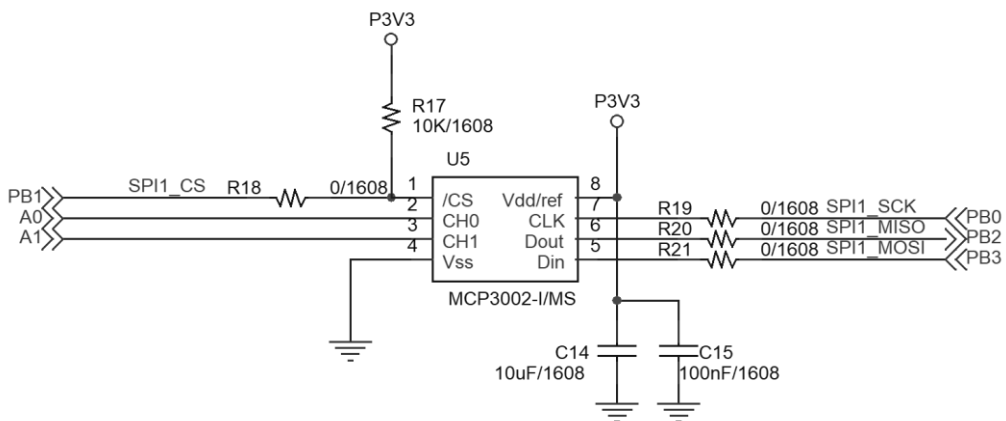


Figure 9 ADC Circuit

2.6.3. GPIO

LoRa Module 의 설정으로 사용하지 않는 GPIO 를 제어가 가능합니다.

Command “AT+GPIO”를 이용하여 In/Output 설정, 상태확인이 가능합니다.

자세한 내용은 AT+Command Manual 을 참고합니다.

LED (LED3)

LoRa Module 의 PA12 를 이용하여 LED(LED3)제어가 가능합니다.

PA12 가 OUTPUT HIGH 인 경우에 점등이 됩니다.

Switch (SW3)

SW3 를 통하여서 LoRa Module 의 PA10 의 입력상태를 제어할 수 있습니다.

PA10 은 HIGH(3.3V)가 기본이며, SW3 를 누르면 LOW(0V)가 됩니다.

3. APPLICATION NOTE

3.1. FIRMWARE UPDATE

3.1.1. Board Setting

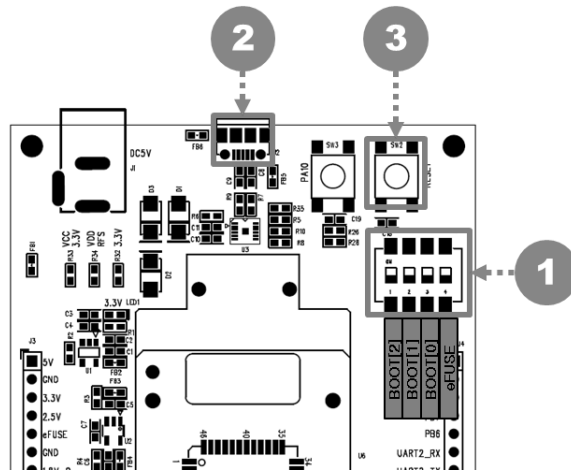


Figure 10 Firmware Update Board Setting

1. Boot Mode Switch(SW4) 를 이용하여 Firmware Upload Mode 로 설정합니다.

Table 3. Boot Mode Setting

Mode	Switch Setting	Description
Default Mode (ROM BOOT)	0000	동작 기본 Mode
Firmware Upload Mode (UART to Flash Boot)	0100	Firmware Update 시에 사용 Update 후에는 Default Mode 전환

2. Micro USB Connector(J2)와 PC 를 Micro USB Cable 로 연결합니다.
3. Reset Switch (SW2)를 눌러서 Reset 을 합니다.

3.1.2. Firmware Updater Setting & Upload

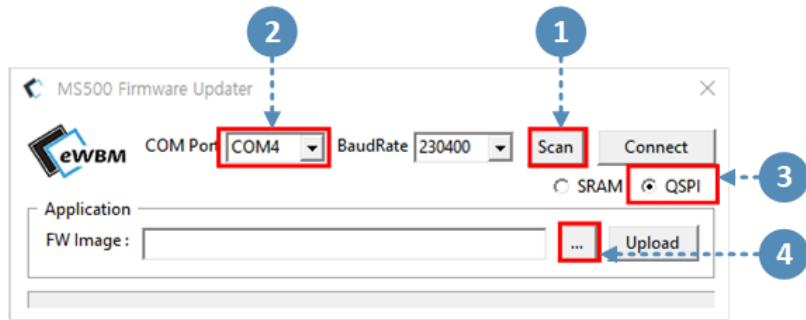


Figure 11 Firmware Setting 1

1. AS-BELLNAVY-LRWAN-04K41 가 PC 와 연결된 상태에서 Scan 을 클릭합니다.
2. COM Port 를 AS-BELLNAVY-LRWAN-04K41 와 연결된 Port 로 설정합니다.
3. QSPI 를 선택합니다.
4. ...을 클릭해서 Upload 할 .img 파일을 선택합니다.

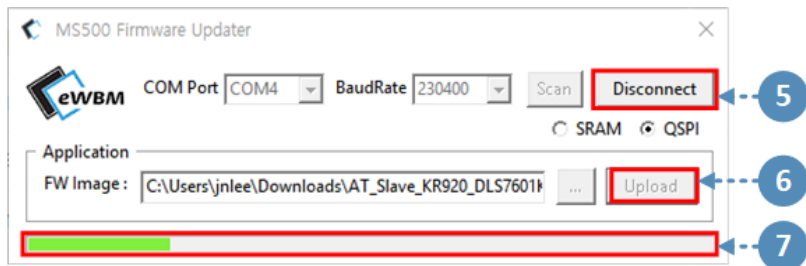


Figure 12 Firmware Setting 2

5. Connect 를 클릭합니다.
6. Upload 를 클릭합니다.
7. 녹색 Bar 를 통해 Upload 상태를 확인합니다.

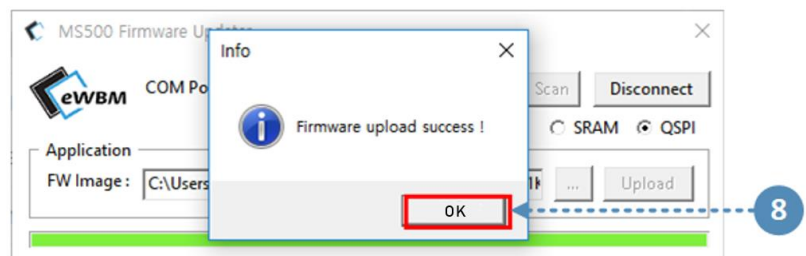


Figure 13 Firmware Setting 3

- “Firmware Upload Success !” 메시지를 확인 후 클릭합니다.
Upload 후에는 Board 설정을 기본값으로 되돌립니다.



DOCUMENT REVISION AND REFERENCE

Revision History

Revision	Date	Description
0.1	2019-03-05	1 st Release

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