

# MBC-Q Controller Operating Instruction

## I. Product Structure

| No. | Name             | Description                                                                                  |
|-----|------------------|----------------------------------------------------------------------------------------------|
| 1   | Photodiode       | External Optical Feedback Input                                                              |
| 2   | Ca An pins       | Modulator's Internal photodiode Input                                                        |
| 3   | Power Connector  | Controller's power supply connector                                                          |
| 4   | PLR Pin          | Operation for polar selection                                                                |
| 5   | RST Pin          | Operation for resetting controller                                                           |
| 6   | 3.3 Pin          | 3.3V reference voltage of UART interface                                                     |
|     | GND TX RX Pins   | UART interface for communication                                                             |
| 7   | LED              | <b>Constantly on (Green):</b> Working under tracking state                                   |
|     |                  | <b>On-off or off-on every 0.2s (Green):</b> Initializing and searching for controlling point |
|     |                  | <b>On-off or off-on every 1s (Green):</b> Controller's feedback input power is too weak      |
|     |                  | <b>On-off or off-on every 3s (Red):</b> Controller's feedback input power is too strong      |
|     |                  | <b>Constantly on (Red):</b> Manual mode / Pause control mode                                 |
| 8   | OUT GND Pins     | Controller's bias Output                                                                     |
| 9   | M2 Mounting Hole | Controller's mounting hole                                                                   |

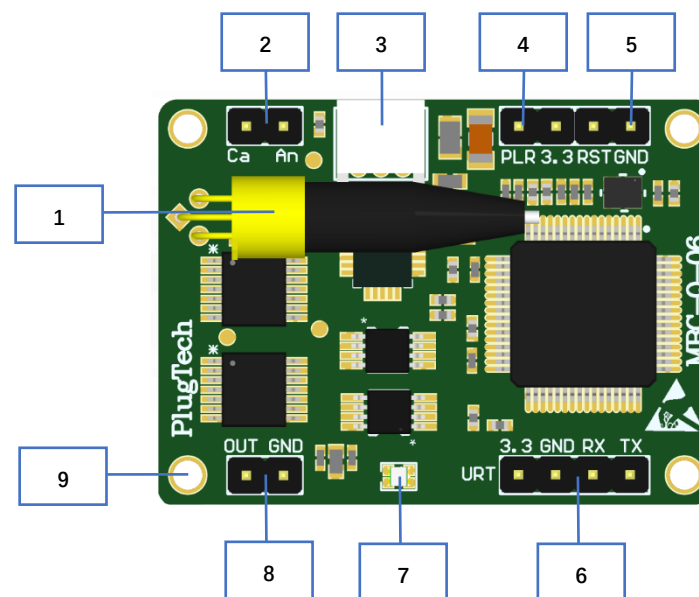


Figure1. Product Structure

## II. Product Operating and Storage Information

| Parameter              | Min   | Typ | Max   | Unit |
|------------------------|-------|-----|-------|------|
| Positive power voltage | +14.5 | +15 | +15.5 | V    |
| Positive power current | 20    |     | 30    | mA   |
| Negative power voltage | -15.5 | -15 | -14.5 | V    |
| Negative power current | 4     |     | 7     | mA   |
| Input optical power    | -30   |     | -9    | dBm  |
| Operating temperature  | -10   |     | 50    | °C   |
| Storage temperature    | -25   |     | 85    | °C   |

III. System Setup Instruction

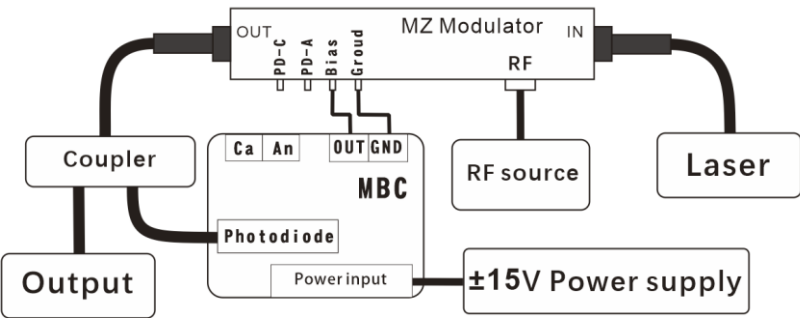


Figure 2. System diagram with controller's on-board photodiode

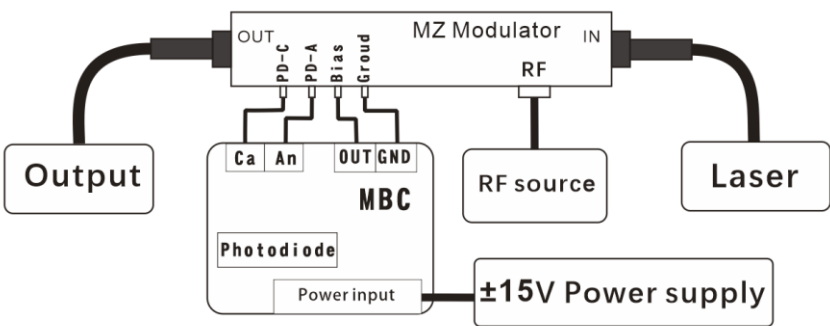


Figure 3. System diagram with modulator's internal photodiode

Depending on the different systems, the controller can be connected to the system as shown in Figure 2 or Figure 3. Here are the setup steps:

Setp1. Setup controller's feedback input

**Note:** User should only choose one of the feedback method between controller's on-board photodiode or modulator's internal photodiode.

1. Using controller's on-board photodiode as feedback input:

Choose an appropriate optical coupler to ensure the controller's feedback optical power is within the range indicated in the Product Operating Information table. For example, if the laser output power is 10dBm and the modulator's insertion loss is 5dB, then the maximum optical output of the modulator is about 5dBm. In this situation, user can choose a 1:99 coupler and the 1% port output power is about -15dBm, which is within the range of controller's input range. Then user can connect the 1% port to controller's on-board photodiode as feedback input and the 99% port is the system's output.

2. Using modulator's internal photodiode as feedback input:

- Connect modulator's **PD-C (Photodiode Cathode)** pin to controller's Ca pin.
- Connect modulator's **PD-A (Photodiode Anode)** pin to controller's An pin.

Step2. Controller's output connection

- Connect controller's **OUT** pin to modulator's DC **Bias** pin.
- Connect controller's **GND** pin to modulator's **Ground** pin.

Step3. Controller's power connection

- Note: V+ connect to +15V DC supply, V- connect to -15V DC supply.
- Controller can be turned on after the RF source and laser output is stable.
- After the controller is turned on, if the LED is lighted, that means the controller starts to work.

## IV. Operating manual

- **Set MBC-Q to work in Q+ point**

1. Connect controller's output and feedback input properly.
2. Keep **PLR** pins not connected.
3. Turn on or reset the controller.

- **Set MBC-Q to work in Q- point**

1. Connect controller's output and feedback input properly.
2. Insert jumper between **PLR** pins.
3. Turn on or reset the controller.

- **Controller Reset:** Insert jumper and pull out after 1 second.

- **UART Command Control (Optional, available for Version A) :**

1. Connect controller's output and feedback input properly.
2. Use UART accessories to connect the controller to PC as shown in Figure4.
3. Turn on bias controller.
4. Use GUI software or Matlab script to operate the UART function.

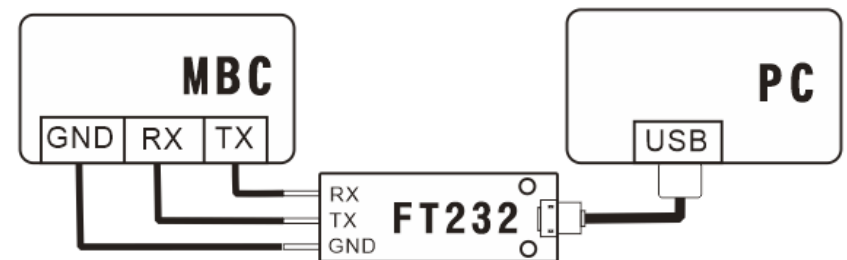


Figure 4. UART Connection

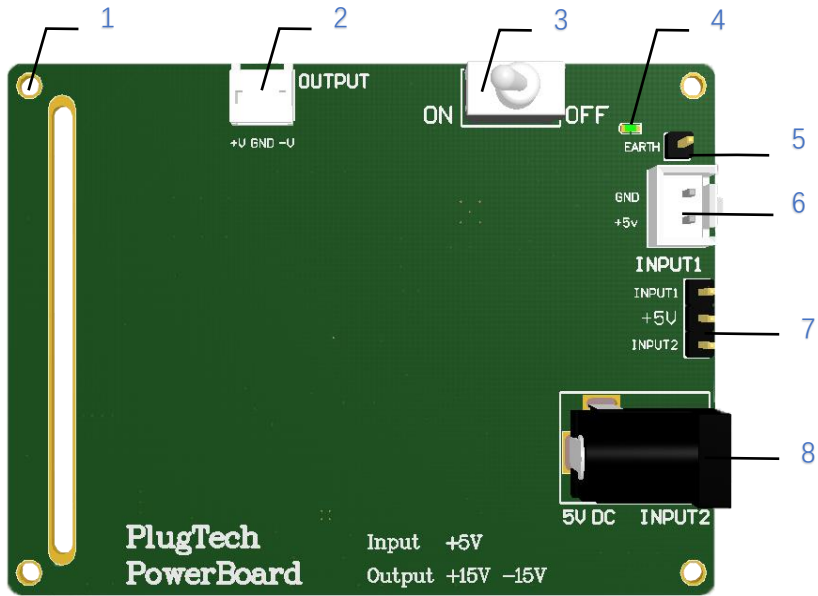
## V. Cautions

- Do not reverse the V+ and V- power pins, otherwise it will cause permanent damage to the controller.
- ESD sensitive, please pay attention to human static electricity when operating.
- Please provide the correct power supply voltage to avoid interfering with the operation of the controller or damaging it.
- It is recommended that the ripple of the power supply be less than 120mV.
- Please turn on the bias controller after the laser and RF output are stable.

# VI. PowerBoard Operation Instruction (Optional)

## 1. Production Instruction

| No. | Name                 | Description                                                 |
|-----|----------------------|-------------------------------------------------------------|
| 1   | M2 Mounting Hole     | Powerboard's Mounting Hole                                  |
| 2   | OUTPUT               | Output voltage $\pm 15V$                                    |
| 3   | Switch               | Control Powerboard's Status                                 |
| 4   | LED                  | Show Powerboard's Status                                    |
| 5   | EARTH pin            | Ground pin                                                  |
| 6   | INPUT1               | +5V Input1                                                  |
| 7   | Input selection port | Connection between input 1 and + 5V:<br>INPUT1 as the input |
|     |                      | Connection between input 2 and + 5V:<br>INPUT2 as the input |
| 8   | INPUT2               | +5V Input2                                                  |



## 2. Operation manual

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Step1: Choose Input Port (User should only choose one of the input port between INPUT1 and INPUT2)</b></p> <p>a) <b>Choose INPUT1</b></p> <ul style="list-style-type: none"><li>● Insert jumper between +5V pin and INPUT1 pin.</li><li>● Provide +5V voltage for INPUT1.</li></ul> <p>b) <b>Choose INPUT2</b></p> <ul style="list-style-type: none"><li>● Insert jumper between +5V pin and INPUT2 pin.</li><li>● Connect the adapter's output to INPUT2.</li></ul> |                                                                                                                                                                                             |
| <p><b>Step2: Powerboard's output connection</b></p> <ul style="list-style-type: none"><li>● Connect powerboard's output to controller's supply connector.</li></ul>                                                                                                                                                                                                                                                                                                        | <p><b>Step3: turn on Powerboard</b></p> <ul style="list-style-type: none"><li>● Turn the switch to the "ON" direction. if the LED is lighted, that mean powerboard start to work.</li></ul> |

| Version | Content                                                                               | Date       |
|---------|---------------------------------------------------------------------------------------|------------|
| 1.0.0   | First Release                                                                         | 2020/11/18 |
| 1.0.1   | Add powerboard's operation Instruction                                                | 2021/1/12  |
| 2.0.0   | Product Structure, Product Operating<br>and Storage Information and Figure1<br>update | 2022/10/26 |