

MBC-HF Controller Operating Instruction

I. Product Structure

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

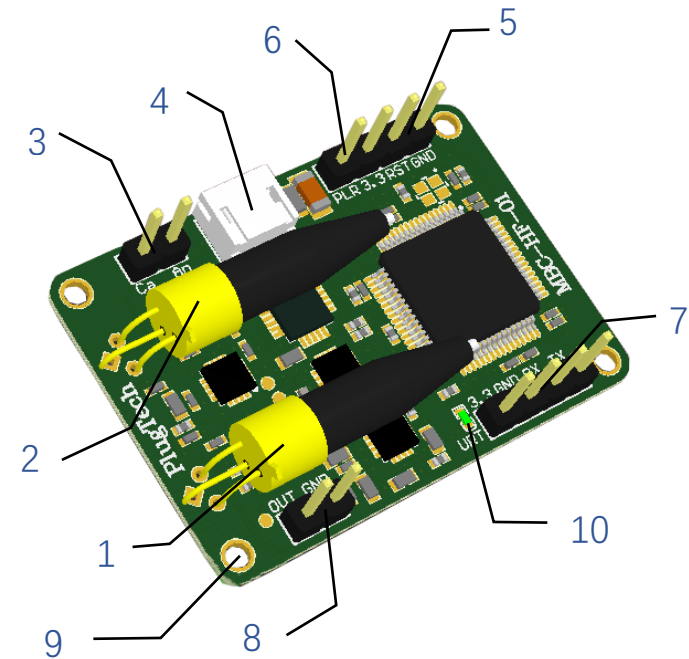


Figure1. Product Structure

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	2		4	mA
Modulator Channel Input optical power	-26		2	dBm
Laser Channel Input optical power	-26		2	dBm
Operating temperature	-10		50	°C
Storage temperature	-20		80	°C

III. System Setup Instruction

The controller is divided into Standard Version (A) and Simplified Version (B), and their system structures are as follows:

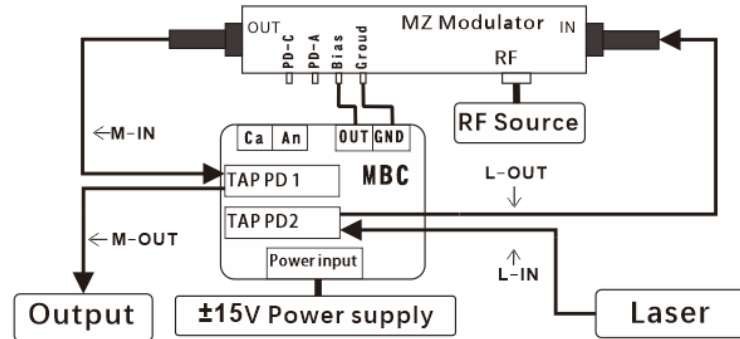


Figure 2. System diagram with controller's on-board photodiode
Standard Version (A)

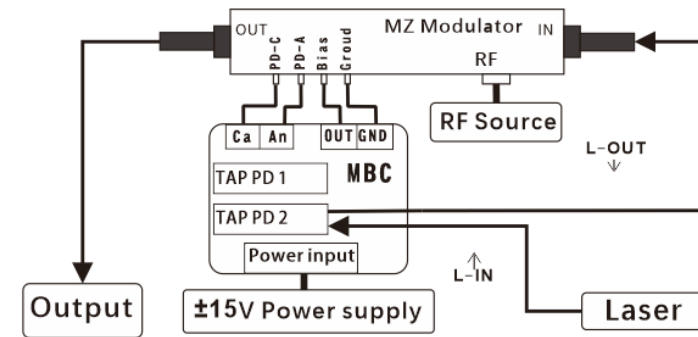


Figure 3. System diagram with modulator's internal photodiode
Standard Version (A)

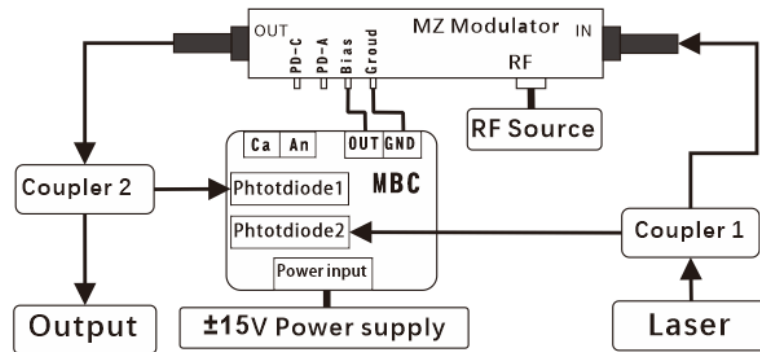


Figure 4. System diagram with controller's on-board photodiode
Simplified Version (B)

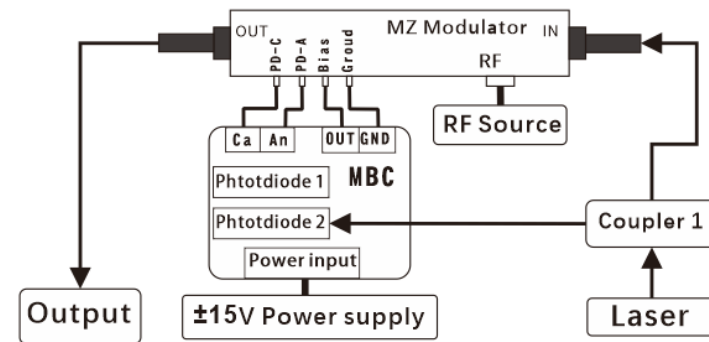


Figure 5. System diagram with modulator's internal photodiode
Simplified Version (B)

Depending on the different systems, the controller can be connected to the system as shown in Figure 2, Figure 3, Figure4, Figure5. Here are the setup steps:

Setp1. Setup controller's feedback input (Laser channel)

Standard Version (A): TAP PD 1 and TAP PD 2 are both photodiodes compatible with 1:99 optical coupler. The laser's output is connected with the **L-IN** of the TAP PD 2, and the **L-OUT** of the TAP PD 2 is connected with the modulator's input.

Simplified Version (B): Choose the appropriate optical coupler 1 to ensure that the feedback optical power is within the range indicated in the Product Operating Information table. For example, if the laser output power is 10dBm, user can choose a 1:99 optical coupler and the 1% port is about -10dBm, which is within the range of the controller's input. The user can connect the laser output with optical coupler 1's input. The 1% port is connected with the Photodiode 2 and the 99% port is connected with the modulator's input.

Setp2. Setup controller's feedback input (Modulator channel)

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:

Standard Version (A):

The modulator's output is connected with the **M-IN** of the Photodiode 1, and the **M-OUT** of the Photodiode 1 is used as the system's output. Please select the appropriate laser power to ensure that the feedback optical power of the modulator channel is within the range shown in the Product Operation Information table. For example, if the laser output power is 10dBm and the insertion loss of the modulator is 5dB, the maximum output optical power of the modulator is 5dBm. Since the Photodiode 1 is compatible with the 1:99 optical coupler function, the feedback optical power of the modulator channel is about -15dbm, which is within the feedback input range of the controller.

Simplified Version (B):

Choose the appropriate optical coupler 2 to ensure that the feedback optical power is within the range shown in the Product Operation Information table. For example, if the laser output power is 10dBm and the insertion loss of the modulator is 5dB, then the maximum optical output of the modulator is about 5dBm. In this situation, user can choose a 1:99 optical coupler and 1% port output power is about -15dbm, which is within the input range of the controller. The user can connect the modulator output with the optical coupler 2's input, 1% port is connected with the Photodiode 1, and 99% port is used as the system 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.

Step3. 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.

Step4. 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-HF 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-HF 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 Figure6.
3. Turn on bias controller.
4. Use GUI software or Matlab script to operate the UART function.

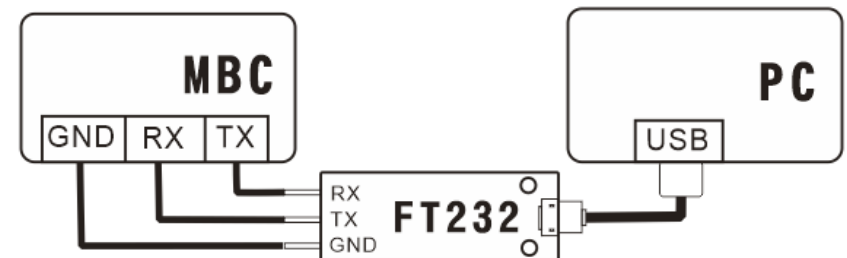


Figure 6. UART Connection

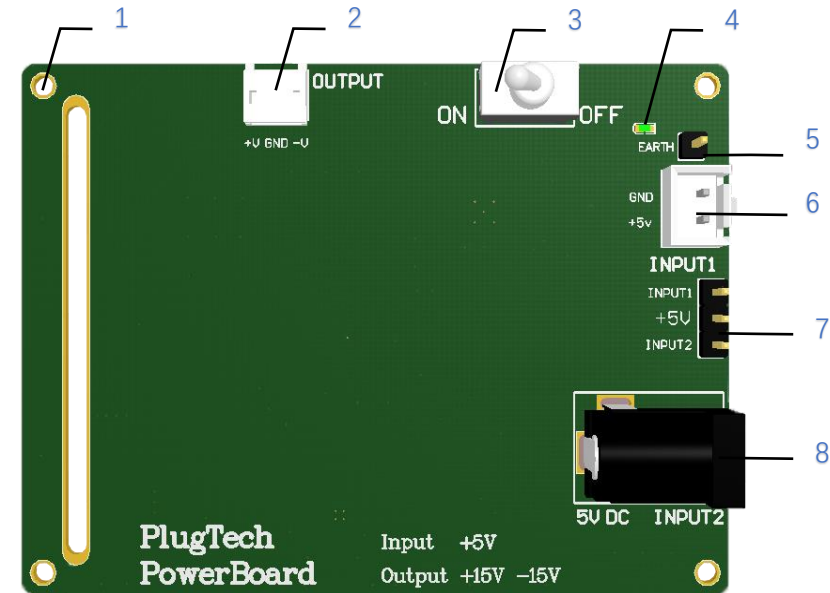
V. Cautions

- 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: INPUT1 as the input Connection between input 2 and + 5V: INPUT2 as the input
8	INPUT2	+5V Input2



2. Operation manual

Step1: Choose Input Port (User should only choose one of the input port between INPUT1 and INPUT2)

a) Choose INPUT1

- Insert jumper between +5V pin and INPUT1 pin.
- Provide +5V voltage for INPUT1.

b) Choose INPUT2

- Insert jumper between +5V pin and INPUT2 pin.
- Connect the adapter's output to INPUT2.

Step2: Powerboard's output connection

- Connect powerboard's output to controller's supply connector.

Step3: turn on Powerboard

- Turn the switch to the "ON" direction. if the LED is lighted, that mean powerboard start to work.

Version	Content	Date
1.0.0	First Release	2020/11/19
1.0.1	Add PowerBoard's operation Instruction	2021/1/12
1.0.2	Correct System Setup Instruction	2022/6/30