

MOA Series

User's Manual



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Contents

1.	Important Safety Instructions	3
1.1	Read and Retain Instructions.....	3
1.2	Follow Instructions and Heed Warnings.....	3
1.3	Amplifier Placement	3
1.4	Cooling the amplifier	3
1.5	Amplifier Mounting Safety Precautions	4
1.6	Restriction of Hazardous Substances Directive (RoHS) Requirements.....	4
2.	Laser Safety	5
2.1	Introduction.....	5
2.2	Warning: Radiation.....	5
2.3	Warning: Fiber Optic Cables	7
2.4	Safe Operation for Software Controlling	7
3.	Product Description	8
3.1	Overview.....	8
3.2	Accessories	8
4.	Amplifier Summary	9
4.1	Mechanical dimensions	9
4.2	Amplifier Overview	10
4.3	Electrical pinout.....	11
4.4	Optical input/output configuration	11
5.	Amplifier operation:.....	11
5.1	Power on:	11
5.2	Constant current control mode.....	12
5.3	Constant output power control mode.....	12
5.4	Constant gain control mode (optional)	12
6.	Remote commands	12
6.1	Serial port configuration.....	12
6.2	Syntax	13
6.3	Control Commands.....	13
6.4	Monitoring Commands.....	15

1. Important Safety Instructions

1.1 Read and Retain Instructions

Carefully read all safety and operating instructions before operating this amplifier, and retain them for future reference.

1.2 Follow Instructions and Heed Warnings

Follow all operating instructions. Pay attention to all warnings and cautions in the operating instructions, as well as those that are affixed to this amplifier.

The MOA's user is responsible for applying the safety instructions indicated in this manual.

BKtel shall not be held responsible or liable for any injuries to the user or third parties caused by non-compliant use of this MOA amplifier.

1.3 Amplifier Placement

WARNING:

Avoid personal injury and damage to this amplifier. An unstable mounting surface may cause this amplifier failure.

To protect against amplifier damage or injury to personnel, comply with the following:

- Install this amplifier in a restricted access location.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other amplifier that produce heat.
- Make sure the mounting surface is stable and can support the size and weight of this amplifier.
- Ensure this amplifier is securely fastened to the mounting surface where necessary to protect against damage due to any disturbance and subsequent fall.

1.4 Cooling the amplifier

To ensure amplifier reliability and safe operation, fix the amplifier on a heatsink with an air flow. Both heatsink and air flow have to be strong enough to ensure the heat dissipation. Do not block or cover any of the ventilation openings. Install the amplifier in accordance with the manufacturer's instructions.

CAUTION:

Installation of this amplifier in an equipment should be such that the amount of airflow required for safe operation of this amplifier is not compromised.

1.5 Amplifier Mounting Safety Precautions

1.5.1 Mechanical Loading

Make sure that the amplifier is placed on a stable surface. If the equipment has stabilizing devices, install these stabilizing devices before mounting the amplifier in the equipment.

WARNING:

Avoid personal injury and damage to this amplifier. Mounting this amplifier in the equipment should be such that a hazardous condition is not caused due to uneven mechanical loading.

1.5.2 Elevated Operating Ambient Temperature

Only install this amplifier in a humidity- and temperature-controlled environment that meets the requirements given in this amplifier's technical specifications.

CAUTION:

If installed in a closed assembly, the operating ambient temperature of the amplifier environment may be greater than room ambient temperature. Therefore, install this amplifier in an environment compatible with the manufacturer's maximum rated ambient temperature.

1.5.3 Handling Precautions

When moving a cart that contains this amplifier, check for any of the following possible hazards:

WARNING:

Avoid personal injury and damage to this amplifier! Move any amplifier and cart combination with care. Quick stops, excessive force, and uneven surfaces may cause this amplifier and cart to overturn.

- Use caution when moving this amplifier/cart combination to avoid injury from tip-over.
- If the cart does not move easily, this condition may indicate obstructions or cables that may need to be disconnected before moving this amplifier to another location.
- Avoid quick stops and starts when moving the cart.
- Check for uneven floor surfaces such as cracks or cables and cords.

1.6 Restriction of Hazardous Substances Directive (RoHS) Requirements

The amplifier conforms to the restriction of hazardous substances directive in electrical and electronic laser (RoHS) requirements.

2. Laser Safety

2.1 Introduction

This amplifier contains an infrared laser that transmits intensity-modulated light and emits invisible radiation.

The MOA amplifier is only intended for integration into other equipment. The MOA amplifier does not meet the full requirements for complete laser system as define by EN 60825-1. The customer is responsible for IEC 60825-1 compliance of their system.

2.2 Warning: Radiation

This amplifier is a laser class 1M according to IEC 60825-1 standard.



WARNING:

- ***Avoid personal injury! Use of controls, adjustments, or procedures other than those specified herein may result in hazardous radiation exposure.***
- ***Avoid personal injury! The light source from this amplifier or the fiber cables connected to this amplifier or the hand piece connected to this amplifier emits invisible laser radiation. Avoid direct exposure to the laser light source.***
- ***Avoid personal injury! Direct viewing the amplifier output (hand piece or fiber) may pose an eye hazard.***
- ***The amplifier beam can be collimated. The hazards apply at short to long distances from the aperture***
- ***Do not stare into the beam or at any mirror-like surface that could reflect the light emitted from the amplifier.***

- ***Do not view the beam with optical instruments (for example, eye loupes, magnifiers, microscopes).***
- ***The light emitted from this amplifier generates heat, care about the fire start possibility.***
- ***Never operate the system if the cover of the module has been removed. Doing so may expose to invisible laser radiation that can cause serious eye damage and possible vision loss.***
- ***Do not remove system's cover, make adjustments to, or attempt to repair the MOA amplifier. Only BKtel service personnel should perform repairs and adjustments.***

2.3 Warning: Fiber Optic Cables

WARNING:

Avoid personal injury! Qualified service personnel may only perform the procedures in this manual. Wear safety glasses and use extreme caution when handling fiber optic cables, particularly during splicing or terminating operations. The thin glass fiber core at the center of the cable is fragile when exposed by the removal of cladding and buffer material. It easily fragments into glass splinters. Using tweezers, place splinters immediately in a sealed waste container and dispose of them safely in accordance with local regulations.

2.4 Safe Operation for Software Controlling

Certain safety precautions must be observed when using the software to control this amplifier.

For laser specific safety requirements, refer to the appropriate section of the amplifier documentation.

For safe operation of this software, refer to the following warnings.

WARNING:

- **Ensure that all optical alignments are complete or terminated before using this amplifier remotely controlled. An amplifier device can pose a hazard to remotely located personnel when operated without their knowledge.**
- **Allow only personnel trained in laser safety to operate this software. Otherwise, injuries to personnel may occur.**
- **Restrict access of this software to authorized personnel only.**
- **Control the amplifier with this software only if the amplifier is located in a restricted access area.**

3. Product Description

3.1 Overview

The MOA amplifier is a stand-alone optical fiber amplifier module for integration into telecommunication or cable TV equipments.

3.2 Accessories

When you receive the unit, verify the accessories specified in the Packing list.

If the shipping container or the packing material is damaged, keep it until the contents of the shipment have been checked to be free of mechanical and electrical damages.

You should find the following accessories:

Item number	Item	Quantity
1	MOA amplifier	1
2	MOA evaluation kit (optional)	1

Table 1: Packing list

4. Amplifier Summary

4.1 Mechanical dimensions

4.1.1 MOA

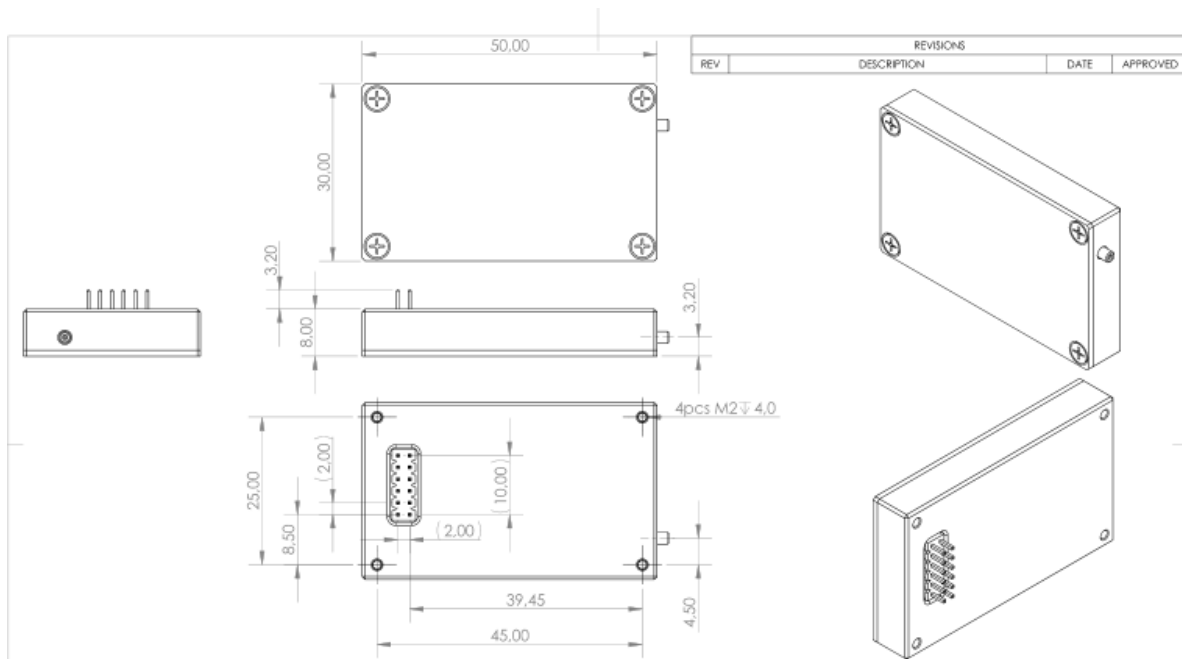


Figure 1: mechanical dimensions

4.2 Amplifier Overview

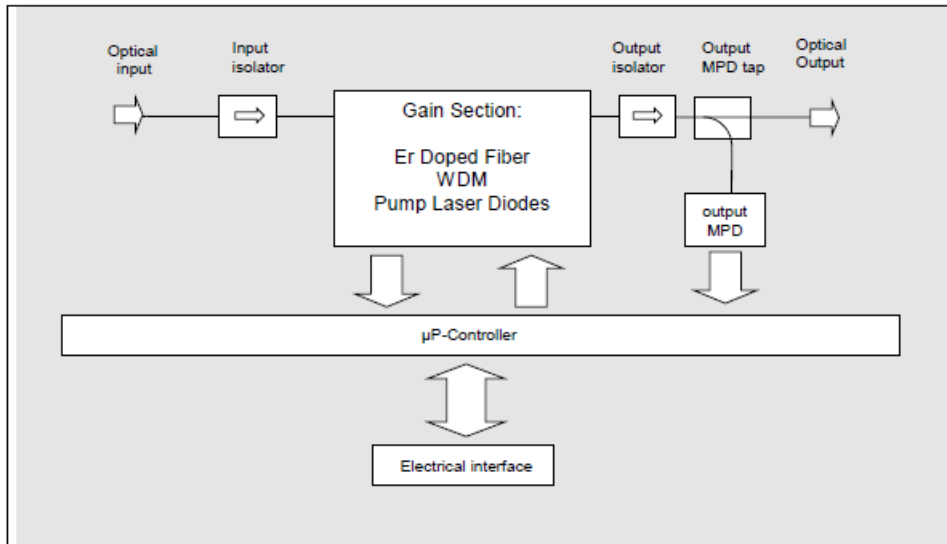


Figure 2: Block diagram

4.3 Electrical pinout

Electrical Connector: TMMH-106-01-F-D

Pin	Meaning	Remark
1	+3.3 VDC	
2	+3.3 VDC	
3	GND	
4	GND	
5	RS232 Input	default 9600 Baud
6	RS232 Output	default 9600 Baud
7	Reserved	
8	Loss of Output Power Alarm	Active Low
9	EDFA Shutdown	Active Low
10	Pump Current Alarm	Active Low
11	NC	
12	Reserved	

The power voltage is specified on the test report of the amplifier.

4.4 Optical input/output configuration

4.4.1 Case of a non-PM amplifier

Cable diameter	Input color	Output color
900 μ m	Blue	Red

5. Amplifier operation:

5.1 Power on:

1. Before power on the amplifier, respect all the recommendation described in chapter 1 and 2.
2. Power the MOA eval kit evaluation under 3.3V
3. To allow the operation of the amplifier the ADI switch has to be off (ADI LED OFF) (cf. PM-TI-001-Eval Box guide.pdf).
4. Choose one of the operation mode available. The amplifier has 2 different controlled modes and 1 optional control mode.

5.2 Constant current control mode

To operate the amplifier in this mode, set the amplifier in constant current control mode with the serial interface.

5.3 Constant output power control mode

To operate the amplifier in this mode, set the amplifier in constant output power control mode with the serial interface.

5.4 Constant gain control mode (optional)

To operate the amplifier in this mode, set the amplifier in constant gain control mode with the serial interface.

6. Remote commands

6.1 Serial port configuration

The MOA modules shall be controlled by serial USB interface. Terminal emulator programs shall be used to communicate with the module (e.g. Microsoft Hyper terminal). The communication should be handled by "host" (device controlling the MOA module) and "target" (MOA module responding) mode.

The MOA modules shall use the following terminal interface parameter:

Terminal Parameter	Setting	Unit
Baud rate	9600 (default)	Baud
Data bits	8	Bits
Parity	None	
Stop bits	1	Bit
Flow control	None	

The MOA modules shall report the parameter by using the following units:

Parameter	Unit
Current	mA
Optical signal power	dBm
Pump optical signal power	mW
Temperature	°C

Accuracy of the reported parameters is with one valid figure right of the decimal point.

Input command formats containing figures with or without decimal point must be handled.

Output strings shall be in floating point format.

6.2 Syntax

- In this section a space command will be written [SP], a carriage return [CR] and a line feed [LF]
- Each commands must end with a [CR][LF]
- Each answers are ended by [CR][LF]
- „X amplifier position“ can be 1 / 2 / 3 depending of the design

6.3 Control Commands

6.3.1 RCC command:

Reports the lasers current setting used in current control mode.

Command form: RCC[SP]X[CR][LF]

(where X is the laser position)

Answer form: CC[SP]X[SP]YYYY.YY[SP]mA[CR][LF]

(where YYYY.YY is the laser current in mA)

6.3.2 SCC command:

Sets the lasers current consign used in current control mode.

Command form: SCC[SP]X[SP]YYYY.YY[CR][LF]

(where X is the laser position & YYYY.YY the requested laser current in mA)

Answer form: SCC[SP]X[SP]YYYY.YY[CR][LF]

6.3.3 RGC command:

Reports the EDFA gain setting used in gain control mode.

Command form: RGC[CR][LF]

Answer form: GC[SP]YY.YY[SP]dB[CR][LF]

(where YY.YY is the gain consign in dB)

6.3.4 SGC command:

Sets the EDFA gain consign used in gain control mode.

Command form: SGC[SP]YY.YY[CR][LF]

(where YY.YY is the requested gain in dB)

Answer form: SGC[SP]YY.YY[CR][LF]

6.3.5 RPC command:

Reports the EDFA output power setting used in output power control mode.

Command form: RPC[CR][LF]

Answer form: PC[SP]YY.YY[SP]dBm[CR][LF]

6.3.6 SPC command:

Sets the EDFA output power consign used in output power control.

Command form: SPC[SP]YY.YY[CR][LF]

(where YY.YY is the requested output power in dBm)

Answer form: SPC[SP]YY.YY[CR][LF]

6.3.7 RMODE command:

Reports the EDFA operating mode.

Command form: RMODE[CR][LF]

Answer form: MODE[SP]XX[CR][LF]

(where XX can be:

PC in case of output power control mode

CC in case of current control mode

OFF in case of shutdown mode)

6.3.8 SMODE command:

Sets the EDFA operating mode.

Command form: SMODE[SP]XX[CR][LF]

(where XX can be:

PC in case of output power control mode

CC in case of current control mode

OFF in case of shutdown mode)

Answer form: SMODE[SP]XX[CR][LF]

6.3.9 RRS command (optional):

Reports the device RS232 Baud rate.

Command form: RRS [CR] LF]

Answer form: RS232[SP]SPEED: [SP] xxxxx [SP]Bds[CR][LF]

(where xxxxx is the RS232 Baud rate from 1200 to 115200 Bauds)

6.3.10 SRS command (optional):

Set the device RS232 Baud rate.

Command form: SRS[SP]xxxxx[CR][LF]

Answer form: SRS[SP]xxxxx[CR][LF]

(where xxxxx is the RS232 Baud rate from 1200 to 115200 Bauds)

6.4 Monitoring Commands

6.4.1 RA command:

Reports the device alarms status.

Command form: RA[CR][LF]

Answer form: ALARMS:[SP]XXXX[SP]XXXX[SP].....[SP]XXXX[CR][LF]

(where XXXX can be:

POUT in case of loss of output power alarm (Option)

PUMP_TEMP in case of pump temperature alarm

PUMP_BIAS if the amplifier current is over 95% of EOL

DEVICE_TEMP in case of internal temperature alarm

DEVICE_PSU in case of power supply alarm

6.4.2 RLC command:

Reports the pump amplifiers current.

Command form: RLC[SP]X[CR][LF]

(where X is the amplifier position)

Answer form: LC[SP]X[SP]YYYY.YY[SP]mA[CR][LF]

(where YYYY.YY is the amplifier current in mA)

6.4.3 RIT command:

Reports the device internal temperature.

Command form: RIT[CR][LF]

Answer form: IT[SP]YY.YY[SP]C[CR][LF]

(where YY.YY is the internal temperature in °C)

6.4.4 RI command:

Reports the device information.

Command form: RI[CR][LF]

Answer form: Vendor=[SP]Bktel[SP]Photonics[CR][LF]

Module=[SP]XXXXXX[CR][LF]

HW[SP]Ver=[SP]0[CR][LF]

HW[SP]Rev=[SP]A[CR][LF]

SW[SP]Ver=[SP]0.01[CR][LF]

FW[SP]Ver=[SP]0.01[CR][LF]

Part[SP]Num=[SP]YYYYYY[CR][LF]

Ser.[SP]Num=[SP]ZZZZZZZZZZ[CR][LF]

Prod.[SP]Date=[SP]DDDDDDDD[CR][LF]

(where XXXXXX is unit type, YYYYYY is the part number, ZZZZZZZZZZZZ is the serial number)

6.4.5 RPM command:

Reports the power level on the monitoring photodiodes.

Command form: RPM[CR][LF]

Answer form: PD1[SP]XX.XX[SP]W[CR][LF]

(where XX.XX is the power in Watt, the values are displayed only if the photodiodes are mounted)

6.4.6 RV command:

Reports the device power supply voltage.

Command form: RV[CR][LF]

Answer form: V[SP]YY.YY[SP]V[CR][LF]

(where YY.YY is the power supply voltage in V)