

# Piezo Driver MTAD3001



## Instruction Manual

(Version 1.0)

## 1 Overview

The Piezo driver MTAD3001 is a linear amplifier with high precision and low noise, designed to drive capacitive load such as the piezoelectric actuators. A DC bias can be applied easily with knob attached. Therefore, a bias voltage can be easily added to the intended driving pattern. A built-in protector is attached inside to detect malfunction such as overload and short circuit. The built-in protector will activate when the average output currents goes above 1 Amp or the peak output current goes above  $\pm 5$  Amp. The built-in protector is also designed to adopt into customer control system. The malfunction can be detected externally and the reset action can be done with external signal. A BNC connector is attached for monitoring the output voltage by converting the output voltage to 1/10. With the MTAD3001, the piezoelectric actuators can be driven at any intended driving waveforms or with a closed loop control system.

## 2 Parts

This device is composed of the following parts.

2. 1	MTAD 3001	· · · · ·	1
2. 2	Power supply cable	· · · · ·	1
2. 3	Crimping terminal	· · · · ·	6
2. 4	Instruction manual	· · · · ·	1

## 3 Specifications

3.1	Output voltage range	: 0~150V
3.2	Output current	
	Average output current	: 1A max
	Peak output current	: $\pm 5$ A max
3.3	Bias voltage range	: 0~150V
3.4	Power bandwidth	: DC~70kHz ( Load resistance 200 $\Omega$ 100Vp-p )
3.5	Output stability	: $1 \times 10^{-4}$ /H ( Observation for 1 hour )
3.6	Gain	: 50V / V
3.7	Output noise	: < 5mVp-p ( Tested with a load capacitance of 3 $\mu$ F )
3.8	Controllable voltage range	: 0~150V
3.9	Protection threshold	: Threshold is set at 1 Amp for average output current and $\pm 5$ Amp for peak output current
3.10	Input voltage	: 0 to 3V max
3.11	Waveform monitor	: 1/10 of the output voltage
3.12	Low speed activation	: 4~6s

- 3.13 Power supply : AC100V 50/60Hz or AC230V 50/60Hz  
 3.14 Dimension : 142 (W) x 122 (H) x 325 (D) mm  
 3.15 Weight : 5.5 kg

## 4 Operation manual

### 4.1 Operation parts

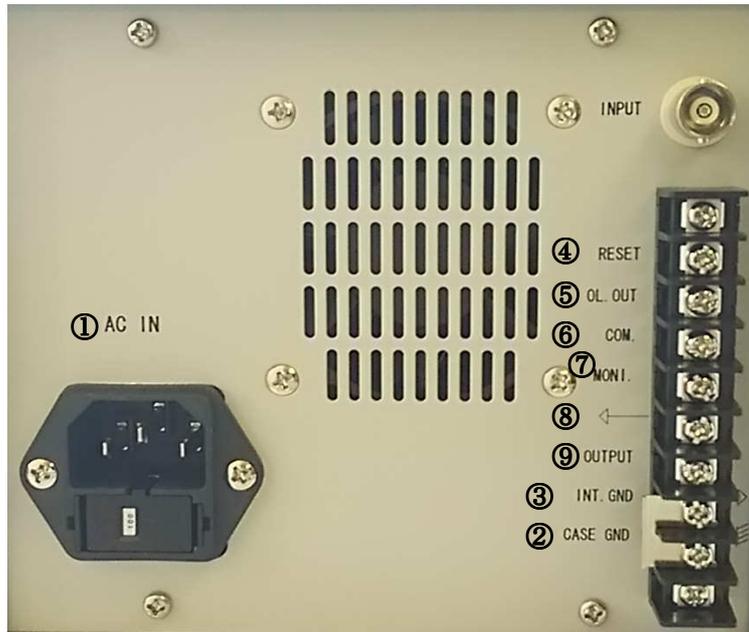
The operation parts on the front and rear panels are shown as follows.

<Front panel>



- ① [POWER] : AC supply switch.  
 ② [V.LIMIT] : Semi-fixed regulator for adjustment of maximum voltage.  
 ③ [OVER L.] : Lighting lamp of overcurrent protection circuit.  
 ④ [BIAS VOLTAGE] : Multi-turn potentiometer knob for DC bias voltage.  
 ⑤ [RESET] : Overcurrent protection circuit reset switch.

<Rear panel>



- |              |  |
|--------------|--|
| ① [AC]       | : AC power supply plug.  |
| ② [CASE GND] | : Ground terminal of body case.  |
| ③ [INT. GND] | : Ground terminal of internal circuit.   |
| ④ [RESET]    | : To reset the MTAD3001 with external TTL level signal(High).                        |
| ⑤ [OL. OUT]  | : An open collector connection to sense an overload drive or short circuit remotely. |
| ⑥ [COM.]     | : GND terminal for external signal.  |
| ⑦ [MONI.]    | : Output terminal for monitor.   |
| ⑧ [←]        | : Grounding-side terminal for monitor & output terminal                              |
| ⑨ [OUTPUT]   | : Output terminal.   |

## 4.2 Operation Methods

### 1) Connection

- ① Connect AC power supply to the [AC] .
- ② Make sure the bias voltage knob is set to zero if bias voltage is not needed.
- ③ Connect the positive wire of the piezoelectric actuators to the [OUTPUT] .
- ④ Connect the negative wire of the piezoelectric actuators to the [INT. GND] .
- ⑤ Connect control signals to the [INPUT] .

## 2) Operation

- a) It is recommended to complete the connection with the piezoelectric actuators before switching on the [POWER] switch.
- b) Make sure the bias voltage knob is set to zero if bias voltage is not needed.
- c) After switching on the [POWER] switch on the front panel, the device will be ready in function in a few seconds. The output voltage can be control with bias voltage knob or the input signal.

## 3) Over load protection circuit

The built-in protector will be activated when the peak current is more than 5Amp or the average output current is more than 1 Amp. When the built-in protector is activated, the [OVER L.] LED on the panel will turn on. Press the [RESET] switch to reset. Only reset the [RESET] switch after make sure there is no short circuit, overload and etc.

## 4) Power bandwidth

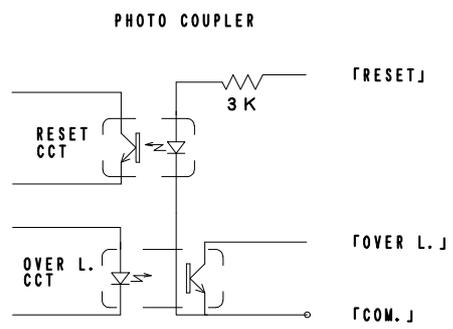
For reference the power bandwidth of the MTAD3001, some examples of the driving conditions are summarized as follows.

Load capacitance	Max. amplitude	Gain bandwidth (− 3 dB)
3 $\mu$ F	100Vp-p	DC~ 2kHz *
1 $\mu$ F	100Vp-p	DC~ 6kHz *

(\* The built-in protector activated as the average output current goes above the threshold.)

## 5) External control of built-in protector

The built-in protector is designed to be access easily from customer control system. The circuit protector can be controlled remotely from an external circuit by TTL High signal level of control signals. The circuit is shown as follows.



With the external control of the circuit protector, operator can detect a malfunction such as overload or short circuit automatically. Besides, the reset can be performed with external signal that is operator's control system.

## 5 Precautions

- 5.1 Do not connect or disconnect the loads when the power is on.
- 5.2 Only reset after you have make sure there is no short circuit or overload. Must make sure the causes that activate the protector circuit is clear before you reset the reset button.
- 5.3 Do not block the ventilation holes created at the enclosures as they are designed for dissipating the heat.

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