Specifications are subject to change without notice.

Model No.: MTAD600

Document No.: MTAD600-DS-EN | Revision: 1 | Issue Date: 2026-10-16

The MTAD600 is a high-performance amplifier designed for precise trapezoidal waveform drive. Its integrated power architecture, fast transition capability, and built-in protection ensure safe, stable operation and long-term reliability across industrial environments.



Features

- Integrated power supply and power amplifier
- Built-in output short-circuit protection and overcurrent protection
- Built-in over-temperature protection in the driver section
- Wide operating temperature range (-25 to +40 °C)
- High reliability

Specifications

MODEL No. MTAD600	
Type	Integrated switching power supply and high-voltage piezo amplifier
AC input	100 to 120 V AC (110 V typ.), 47 to 63 Hz, 1.5 A max
Output voltage range	0 to 150 V
Gain	45 V/V, fixed (44 to 46 V/V)
Signal input	0 to 5 V differential (+IN / -IN); 3.33 V gives 150 V output
Output current	10 A peak, 3.16 A RMS, 1 A average
Max. power dissipation	100 W
Load capacitance	Up to 7.5 µF (larger values available on request)
Slew rate	10 V/µs typ. (no load)
Output noise	20 mVRMS max. (300 kHz bandwidth)
Protection	Output short circuit, overcurrent (auto-recovery), output overvoltage, over-temperature
External shutdown	SD pin: Low (grounded) = shutdown, High (+5 V) = normal operation
Auxiliary output	+24 V DC, 1 A total
Connectors	AC input VH3.96 5Pin / Signal XH2.54 6Pin / Output VH3.96 2Pin / Fan XH2.54 2Pin × 2 / Monitor PH2.0 6Pin
Outline dimensions	122 mm（L）× 120 mm（W）× 55 mm（H）
Weight	580 g
Operating temperature	-25 to +40 °C, 20% to 90% RH, non-condensing
Storage temperature	-25 to +80 °C, 10% to 90% RH, non-condensing
Service life	10,000 hours

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Detailed Specifications

Input Parameters (Power Supply)

Item	Min.	Typ.	Max.	Test Conditions	Unit
Input voltage	100	110	120		V
Input frequency	47	50	63		Hz
Power factor	0.4	0.5	-		-
Efficiency	85%	90%	-	100 W load connected to output V+ (1)	-
Input AC current	-	-	1.5		A
Inrush current at startup	-	-	60	At 110 V input	A
No-load power consumption	-	-	6	At 110 V input	W

Item	Value
Power dissipation (loss)	100 W max.
Startup delay	5 s
Startup overshoot	10% Vo (at power-on / power-off)

24 V Auxiliary Power Supply Parameters

Item	Min.	Typ.	Max.	Test Conditions	Unit
Output voltage	21.6	24	26.4	0.1 to 1 A load	V
Total output current			1		A

Power Amplifier Parameters

Item	Min.	Typ.	Max.	Test Conditions	Unit
Input voltage range	0	3	5		V
Input impedance	50	100	-		kΩ
Output error	-0.5	0	+0.5		V
Gain	44	45	46		V/V
Output noise	-	-	20	300 kHz bandwidth, all inputs grounded, no load	mVRMS
Output impedance	-	-	3		Ω
Slew rate	5	10	-	No load	V/μs
Output offset voltage	-	-	300	All inputs grounded, no load	mV
External Shutdown (SD)	-	-	1	Grounded	mA
Output voltage range	0		150		V
Output overvoltage protection	151		155		V
Output current	-	10	12	10 A peak, 3.16 A RMS, 1 A average	A
Overcu`rrent Protection	15	17	20		A
Overcurrent protection delay	-	-	2	2 Ω load	μs
Over-temperature protection	75	80	85		°C

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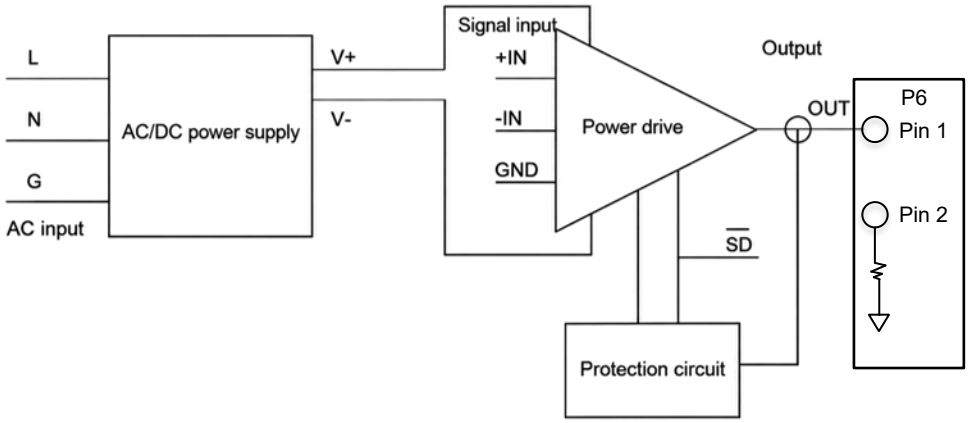
Environment

Item	Value
Operating temperature / humidity	-25 to 40 °C, non-condensing, 20% to 90% RH
Storage temperature / humidity	-25 to 80 °C, non-condensing, 10% to 90% RH

Other Parameters

Item	Value
Dielectric withstand voltage	Input to output, input to input ground: 1500 V AC, 5 mA, 5 s
Service life	10,000 hours
Outline dimensions	122 mm（L）× 120 mm（W）× 55 mm（H）
Weight	580 g

Block Diagram



Signal Input and Gain

The power drive section of the MTAD600 is a low-noise differential amplifier with a gain fixed at 45 V/V. The relationship between input and output voltage is as follows:

$$\mathbf{Vout = (V_{+IN} - V_{-IN}) \times 45}$$

To reduce differential amplifier error, select a signal source with low internal resistance, or use a small-signal operational amplifier as a buffer stage. To reduce noise, use shielded cable for the signal input lines; UL2547 wire is recommended. When a single-ended input is used, the -IN input terminal may be grounded. To reduce common-mode noise, ground at the output side of the signal source and avoid grounding at the amplifier input terminal side. Under these conditions, a +IN input of 3.33 V corresponds to the maximum output voltage of 150 V.

Power Dissipation and Cooling

A piezoelectric load is a reactive load: only a small part of the energy is converted into mechanical and thermal energy, and most of the loss is borne by the amplifier. To ensure long-term reliability, heat dissipation of the amplifier must be given sufficient consideration. Air cooling is recommended, and the operating temperature under the final drive conditions should be evaluated.

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Overcurrent Protection

The amplifier has a built-in overcurrent protection circuit with automatic recovery. When overcurrent protection operates, the output current at the output terminal is limited to approximately ±3 mA maximum, and the amplifier recovers automatically once the fault is cleared.

External Shutdown (SD)

When the input terminal (SD) is Low (grounded), the output stage is shut down. The output stage remains shut down as long as SD is Low. By monitoring SD with a high-impedance circuit, it can be used as a flag indicating when the amplifier has been shut down. “High” on SD (+5 V) indicates that the power amplifier is within its normal range, and “Low” (grounded) indicates the shutdown state.

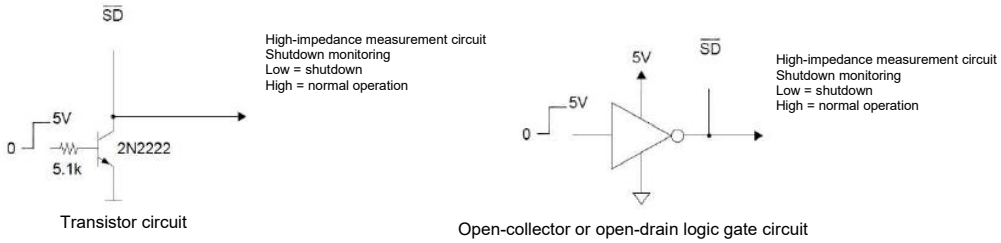


Figure 1. External shutdown circuit with monitoring

Connector Definitions

P1 (VH3.96 5Pin) — AC input
Manufacturer: JST, Housing: VHR-5N, Contact: SVH-41T-P1.1

Pin No.	Name	Description
1	F.G	Connect to input earth (frame ground)
2	-	Not used
3	AC IN	AC input L
4	-	Not used
5	AC IN	AC input N

P2 (XH2.54 6Pin) — Signal input
Manufacturer: JST, Housing: XHP-6, Contact: SXH-001T-P0.6

Pin No.	Name	Description
1	+IN	Signal input +
2	GND	Signal GND
3	-IN	Signal input -
4	SD	External shutdown pin (Low = shutdown)
5	G_V+	+24 V auxiliary power supply GND
6	V+	+24 V auxiliary power supply +

P3 (XH2.54 2Pin) — Fan 1
Manufacturer: JST, Housing: XHP-2, Contact: SXH-001T-P0.6

Pin No.	Name	Description
1	(-)	+24 V auxiliary power supply GND
2	(+)	+24 V auxiliary power supply +

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P4 (XH2.54 2Pin) — Fan 2

Manufacturer: JST, Housing: XHP-2, Contact: SXH-001T-P0.6

Pin No.	Name	Description
1	(-)	+24 V auxiliary power supply GND
2	(+)	+24 V auxiliary power supply +

P6 (VH3.96 2Pin) — Output

Manufacturer: JST, Housing: VHR-2N, Contact: SVH-41T-P1.1

Pin No.	Name	Description
1	(-)	Output - (not the same as GND)
2	(+)	Output +

P7 (PH2.0 6Pin) — Signal control and sampling output

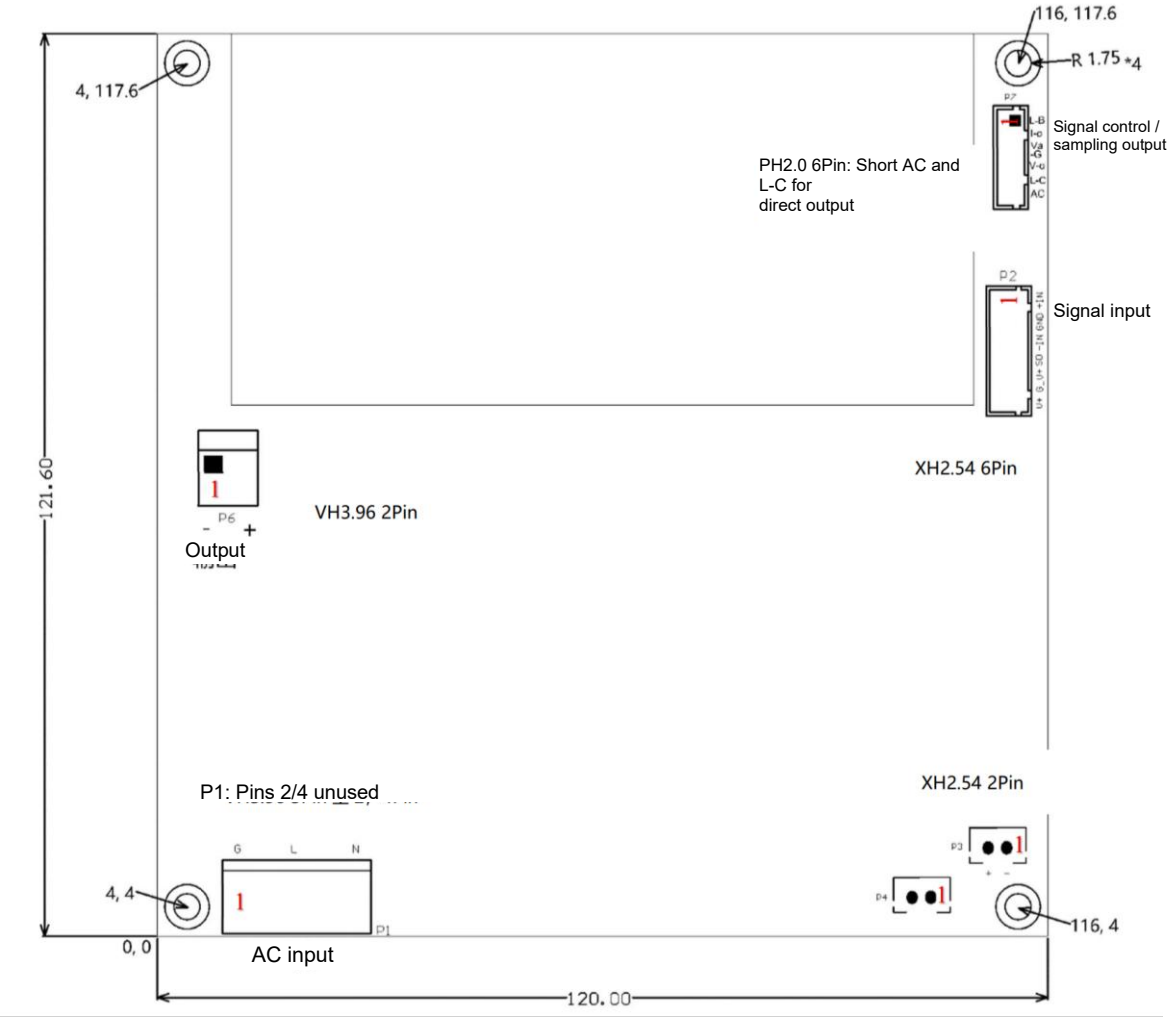
Manufacturer: JST, Housing: PHR-6, Contact: SPH-002T-P0.5L

Pin No.	Name	Description
1	L-B	Discharges the load when High (3.3 V); current is approximately 6.8 mA. Disabled when open or Low. Do not maintain the discharge state for more than 10 s.
2	I-o	Output current sampling output. 1.65 V at 0 A; V = Iout × 0.01 × 20 + 1.65 V.
3	Va-G	GND for the sampling section.
4	Vo	Output voltage sampling output. Vo = Vout / 50.
5	L-C	Load switch. Enabled when High. Operates in AND logic with the AC signal; the load conducts only when both signals are High.
6	AC	AC input power-on signal. High indicates normal power input. 0 V indicates that AC input is absent or the AC voltage is too low.

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Outline Drawing



Notes:

- The power supply section outputs high voltage.
- Connect a 0.1 μF multilayer ceramic capacitor (MLCC) and a 10 μF electrolytic capacitor in parallel at the output.

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Application Examples

- Driving multilayer piezoelectric actuators and piezo-driven stages
- High-speed shutters, valves, and dispensing pumps
- Precision positioning and active vibration control
- Mirror tilt and optical path adjustment
- Repetitive trapezoidal-wave drive in production equipment

Precautions

- The power supply section outputs high voltage (up to 150 V). Do not touch the output terminals or load wiring while the unit is energized.
- Do not connect the output (-) of connector P6 to GND!
- Connect a 0.1 µF multilayer ceramic capacitor (MLCC) and a 10 µF electrolytic capacitor in parallel at the output.
- Provide adequate cooling. A piezoelectric load is reactive, so most losses occur in the amplifier. Air cooling is recommended; verify the operating temperature under the actual drive conditions.
- Use shielded cable for the signal input lines (UL2547 recommended). For a single-ended input, connect the -IN terminal to GND.
- To reduce common-mode noise, ground the circuit at the signal-source output rather than at the amplifier input.
- To reduce differential-amplifier error, use a signal source with low internal resistance or a small-signal operational amplifier as a buffer stage.
- Operate within -25 to +40 °C and 20% to 90% RH, non-condensing.
- The maximum load capacitance is 7.5 µF. Contact us for larger loads.

Revision History

Revision	Date	Description of Change	Approved by
1	2026-10-16	Weight updated	
0	2026-10-15	Initial release	

When revising this data sheet, add a row at the top of the table and update the revision number and issue date on page 1 and in the footer.

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