# PWM power amplifier (MPA2504)

**1. Features** (for outside view, see Fig. 1)
Soldered metal package
Max. output current reaches 10A
Max. drive working voltage: 80V
Input signal voltage outputs linear width-modulated square wave within the range of 0~0.2V
Integrates signal processing and current amplification


Size : 90×65×16.5mm³; weight: 144g

Fig. 1 Outside view of MPA2504

**2. Scope of application**

Speed regulation and control of DC motor; inductive load of drive; C-D welding controller.

**3. Description**

Model MPA2504 PWM power amplifier adopts DC pulse width modulation (PWM) technology with strong functions, its circuit includes two parts: signal processing and power amplification. In this device, when the input signal falls within the range of 0~0.2V, input controls the width modulation of output, when the input signal is higher than 0.2V, the output becomes saturated. When MPO reaches above 100W, the output voltage is 27V and output continuous current is 10A. It can also be customized according to user's requirement. The circuit is a modular structure made in soldered metal package.

**4. Electrical performance**

Table 1 Rated conditions and recommended operating conditions

| | | | |
|---|---|---|---|
| Absolute max. rated value | | Positive supply voltage $V_{+1}$ | 17V |
| | | Positive supply voltage $V_{+2}$ | 80V |
| | | Negative supply voltage V- | -17V |
| | | Reference input voltage (effective value) | 30V |
| | | Storage temperature range | -55~+105℃ |
| Recommended operating conditions | | Positive supply voltage $V_{+1}$ | 15V |
| | | Positive supply voltage $V_{+2}$ | 28V |
| | | Negative supply voltage V- | -15V |
| | | Reference input voltage (effective value) V | 26V |
| | | Reference frequency f | 2kHz |
| | | Working temperature range ($T_A$) | -40~+85℃ |

Table 2 Electric characteristics

| Parameter | MPA2504 Enterprise military standard (Q/HW20391－2003) | | | |
|---|---|---|---|---|
| | Condition | Max. | Min. | Unit |
| Output voltage | $V_{+2}$＝28V | — | 25 | V |
| Output current | $V_{+2}$＝80V | 10 | — | A |
| Output frequency | — | 2.2 | 1.8 | kHz |
| Reference input voltage | — | 28.6 | 23.4 | V |
| Reference signal frequency | — | 2.2 | 1.8 | kHz |
| Output duty cycle | 0～0.2V input | 5 | 95 | % |

**5. Operating principle** (Fig. 2)

The input signal of this circuit is sinusoidal modulated signal after switching between coarse and fine channels, this signal outputs a DC level signal through amplification of AC amplifier, phase discrimination, filtration and integral circuit, this DC level signal is compared with the triangular wave signal produced by the triangular wave generator in the pulse width comparator, and generates PWM square wave signal whose pulse width varies with DC level signal, this square wave signal produces four paths of independent drive signal through MOSEFT driver to drive four MOSEFT field-effect switching tubes of H bridge amplifier, respectively so as to

make H bridge work in two-polarity mode. The main theoretical basis of this circuit is the theory of DC pulse width speed control system.

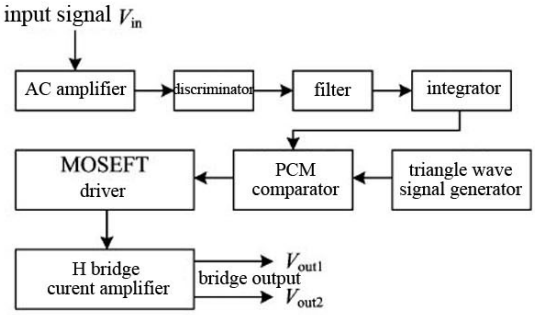


Fig. 2 Circuit block diagram

## 6 MTBF versus temperature curve(Fig. 3)

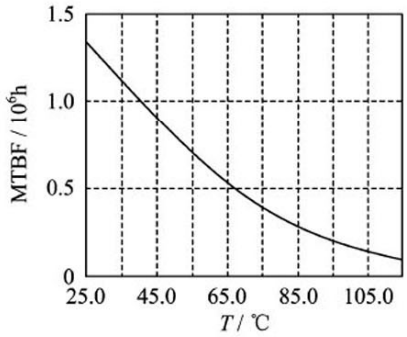


Fig. 3 MTBF vs temperature curve

## 7 Pin designation (Fig. 4, Table 3)

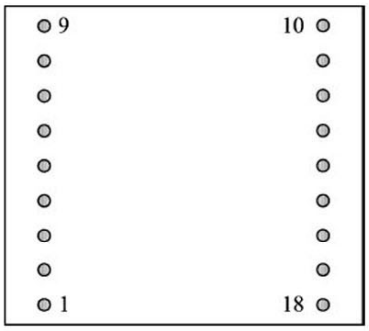


Fig. 4 Schematic diagram of pins(bottom view)

Table 3 Pin designation

| Pin | Symbol | Function | Pin | Symbol | Function |
|---|---|---|---|---|---|
| 1 | $V_{in}$ | input signal | 10 | $out_4$ | sampling output |
| 2 | NC | no connection | 11 | $GND_2$ | power signal ground |
| 3 | NC | no connection | 12 | TIAOLin | zeroing |
| 4 | $V_{+1}$ | +15V power supply | 13 | $out_2$ | bridge output 2 |
| 5 | Case | case ground | 14 | $out_1$ | bridge output 1 |
| 6 | $V_-$ | -15V power supply | 15 | $out_3$ | input signal detection output |
| 7 | $V_{+2}$ | power supply | 16 | −in | inverting input of DC amplifier |
| 8 | $R_{Hi}$ | excitation input high end | 17 | +in | non-inverting input of DC amplifier |
| 9 | $R_{Lo}$ | excitation input low end | 18 | $V_{PID}$ | PID adjusting input |

**8. Connection diagram for typical application** (Fig. 5)

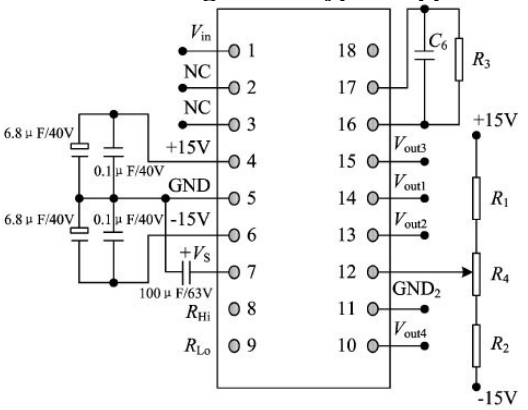


Fig. 5 Connection diagram for typical application

Operating instructions

Connect the circuit according to Fig. 5, $C_6$ and $R_3$ are the feedback elements of DC amplification stage in the circuit. $R_3$ can take 20KΩ. $R_1$, $R_2$ and $R_4$ are used for zero adjustment of the system.

Pin 7 is input end of 28V power supply, pin 4 and 6 are input ends of +15V and -15V power supply respectively, pin 7 needs to be connected with 100μF/63V decoupling capacitance and 0.1~1μF/40V high frequency ceramic dielectric capacitance, pin 4 and 6 need to be connected with 6.8μF/40V decoupling capacitance and 0.1~1μF/40V high frequency ceramic dielectric capacitance.

**9．Package specifications** (Fig. 6, Table 4)

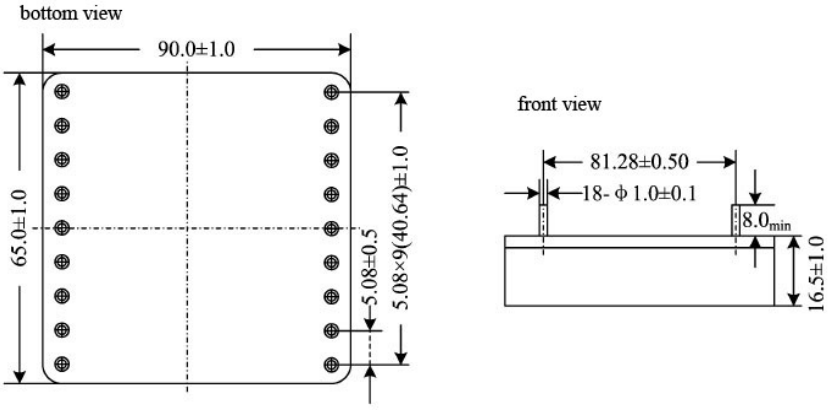


Fig. 6 Outside view and dimensions of package

Table 4 Case materials

| Case model | Header | Header plating | Cover | Covering plating | Pin material | Pin plating | Sealing style | Notes |
|---|---|---|---|---|---|---|---|---|
| PP9065-18 | Cold rolled steel (08AL) | Ni/Sn | Cold rolled steel (08AL) | Ni/Sn | Fe-Ni alloy (4J50) | Ni/Sn | Pressure packaging | |

**10. Part numbering key** (Fig. 7)

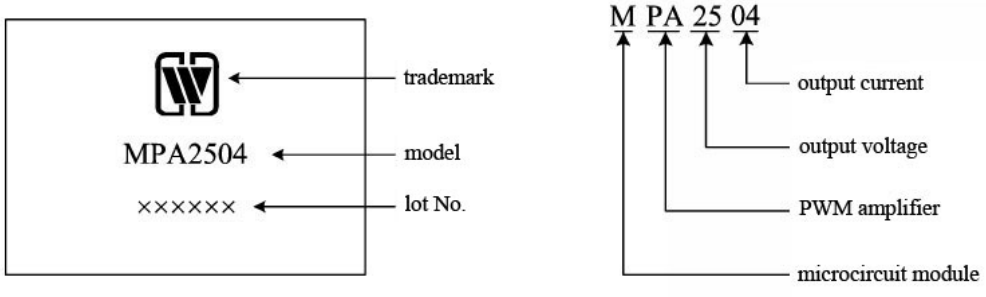


Fig. 7 Part numbering key

Note: Product of different input power and frequency can be customized according to user's requirements.

**Application notes**

When measuring the output waveform between $A_{out}$ and $B_{out}$ of the product with an oscilloscope, the input power supply plug of the oscilloscope shall be 2-phase.

Supply voltage must be kept to the voltage of correct polarity.
When the user places an order for the product, detailed electric performance indexes shall refer to the relevant enterprise standard.