# PA18 • PA18A

## VIDEO POWER OPERATIONAL AMPLIFIERS

## FEATURES

- VERY FAST SLEW RATE – 1500V/$\mu$s
- POWER-MOS OUTPUT – 1A peak rating
- LOW INTERNAL LOSSES – 4V at 1A
- PROTECTED OUTPUT STAGE – Thermal Shutoff
- WIDE SUPPLY RANGE – ±15V to ±40V

## APPLICATIONS

- VIDEO DISTRIBUTION AND AMPLIFICATION
- HIGH SPEED DEFLECTION CIRCUITS
- POWER TRANSDUCERS UP TO 6 MHz
- MODULATION OF RF POWER STAGES
- POWER LED OR LASER DIODE EXCITATION

**PRELIMINARY SPECIFICATIONS SUBJECT TO CHANGE**

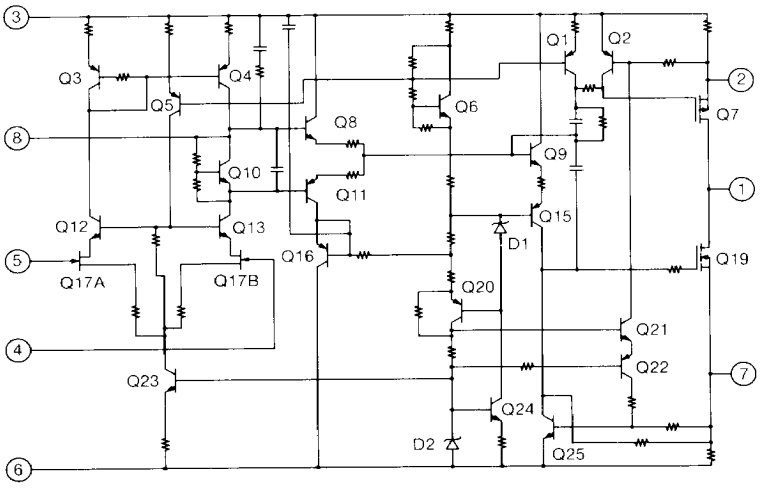
## DESCRIPTION

The PA18 is a high voltage, high current operational amplifier optimized to drive a variety of loads from DC through the video frequency range. Excellent input accuracy is achieved with a dual monolithic FET input transistor which is cascoded by two high voltage transistors to provide outstanding common mode characteristics. All internal current and voltage levels are referenced to a zener diode biased on by a current source. As a result, the PA18 exhibits superior DC and AC stability over a wide supply and temperature range.

High speed and freedom from secondary breakdown is assured by a complementary POWER-MOS output stage. For optimum linearity, especially at low levels, the MOS transistors are biased in the class A/B mode. Thermal shutoff provides full protection against overheating and limits the heatsink requirements to dissipate the internal power losses under normal operating conditions. A built-in current limit of 0.25A can be increased with the addition of two external resistors. Inductive load kickback protection is provided by two internal clamping diodes. External phase compensation allows the user maximum flexibility in obtaining the optimum slew rate and gain bandwidth product at all gain settings. A heatsink of proper rating is recommended.

These hybrid integrated circuits utilize thick film (cermet) resistors, ceramic capacitors and silicon semiconductor chips to maximize reliability, minimize size and give top performance. Ultrasonically bonded aluminum wires provide reliable interconnections at all operating temperatures. The 8 pin TO-3 package is hermetically sealed by resistance welding.

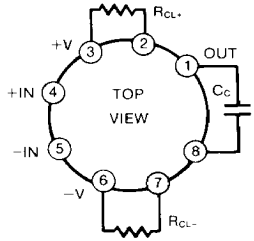
## EQUIVALENT SCHEMATIC



# PA18 ABSOLUTE MAXIMUM RATINGS

| | |
|---|---|
| SUPPLY VOLTAGE, $+V_S$ to $-V_S$ | 80V |
| OUTPUT CURRENT, source | 1A |
| OUTPUT CURRENT, sink | See SOA |
| POWER DISSIPATION, internal | 19W |
| INPUT VOLTAGE, differential | 40V |
| INPUT VOLTAGE, common mode | $\pm V_S$ |
| TEMPERATURE, pin solder-10sec | 300°C |
| TEMPERATURE, junction[1] | 150°C |
| TEMPERATURE, storage | −65 to 155°C |
| TEMPERATURE RANGE, powered (case) | −55 to 125°C |

## EXTERNAL CONNECTIONS




| PHASE COMPENSATION | |
|---|---|
| GAIN | $C_C$ |
| 1 | 330pF |
| 10 | 22pF |
| 100 | 2.2pF |
| 1000 | 0 |

# SPECIFICATIONS

| | | PA18 | | | PA18A | | | |
|---|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST COND.** | **MIN** | **TYP** | **MAX** | **MIN** | **TYP** | **MAX** | **UNITS** |
| **INPUT** | | | | | | | | |
| Offset Voltage, initial | $T_C$ = 25°C | | .5 | ±3 | | ±.25 | ±.5 | mV |
| vs. temp. | $T_C$ = 25 to +85°C | | 10 | 30 | | 5 | 10 | µV/°C |
| vs. supply | $T_C$ = 25°C | | 10 | | | * | | µV/V |
| vs. power | $T_C$ = 25 to +85°C | | 20 | | | * | | µV/W |
| Bias Current, initial | $T_C$ = 25°C | | 10 | 200 | | 5 | 50 | pA |
| vs. supply | $T_C$ = 25°C | | .01 | | | * | | pA/V |
| Offset Current, initial | $T_C$ = 25°C | | 5 | 100 | | 3 | 25 | pA |
| Input Impedance, dc | $T_C$ = 25°C | | $10^{11}$ | | | * | | MΩ |
| Input Capacitance | $T_C$ = 25°C | | 6 | | | * | | pF |
| Common Mode | | | | | | | | |
| Voltage Range[3] | $T_C$ = 25 to +85°C | $\pm V_S$ −12 | $\pm V_S$ −10 | | * | * | | V |
| Rejection, dc | $T_C$ = 25 to +85°C, $V_{CM}$ = ±20V | 70 | 104 | | * | * | | db |
| **GAIN** | | | | | | | | |
| Open Loop at 10Hz | $T_C$ = 25°C, $R_L$ 1kΩ | | 111 | | | * | | db |
| Open Loop at 10Hz | $T_C$ = 25°C, $R_L$ 15Ω | | 78 | | | * | | db |
| Gain Bandwidth Product at 1MHz | $T_C$ = 25°C, $C_C$ = 1.0pF | | 150 | | | * | | MHz |
| Power Bandwidth, gain = 100 | $T_C$ = 25°C, $C_C$ = 1.0pF | | 6 | | | * | | MHz |
| Power Bandwidth, gain = 1 | $T_C$ = 25°C, $C_C$ = 200pF | | .75 | | | * | | MHz |
| **OUTPUT** | | | | | | | | |
| Voltage Swing[3] | $T_C$ = 25°C, $I_O$ = 1A | $\pm V_S$ −5 | $\pm V_S$ − 4 | | * | * | | V |
| Voltage Swing[3] | $T_C$ = 25 to +85°C, $I_O$ = 4A | $\pm V_S$ −3 | $\pm V_S$ − 2 | | * | * | | V |
| Voltage Swing[3] | $T_C$ = 25 to +85°C, $I_O$ = 78mA | $\pm V_S$ −1 | $\pm V_S$ − .5 | | * | * | | V |
| Settling Time to .1% | $T_C$ = 25°C, 2V step | | .3 | | | * | | µs |
| Settling Time to .01% | $T_C$ = 25°C, 2V step | | 1.2 | | | * | | µs |
| Slew Rate, gain = 100 | $T_C$ = 25°C, $C_C$ = 1.0pF | | 1500 | | | * | | V/µs |
| Slew Rate, gain = 10 | $T_C$ = 25°C, $C_C$ = 15pF | | 1000 | | | * | | V/µs |
| **POWER SUPPLY** | | | | | | | | |
| Voltage | $T_C$ = 25 to +85°C | ±15 | ±35 | ±40 | * | * | * | V |
| Current, quiescent | $T_C$ = 25°C | | 75 | | | * | * | mA |
| **THERMAL** | | | | | | | | |
| Resistance, AC junction to case | $T_C$ = 25 to +85°C, F>60Hz | | 5.1 | 5.6 | | * | * | °C/W |
| Resistance, DC junction to case | $T_C$ = 25 to +85°C, F<60Hz | | 6 | 6.6 | | * | * | °C/W |
| Resistance, junction to air | $T_C$ = 25 to +85°C | | 30 | | | * | | °C/W |

**NOTES:** * The specification of PA18A is identical to the specification for PA18 in applicable column to the left.

1. Long term operation at the maximum junction temperature will result in reduced product life. Derate internal power dissipation to achieve high MTTF.
2. The power supply voltage for all tests is ±35 unless noted as a test condition.
3. $+V_S$ and $-V_S$ denote the positive and negative supply rail respectively. Total $V_S$ is measured from $+V_S$ to $-V_S$.
4. Rating applies if the output current alternates between both output transistors at a rate faster than 60Hz.
5. The internal substrate contains beryllia (BeO). Do not break the seal. If accidently broken, do not crush, machine, or subject to temperatures in excess of 850°C to avoid generating toxic fumes.