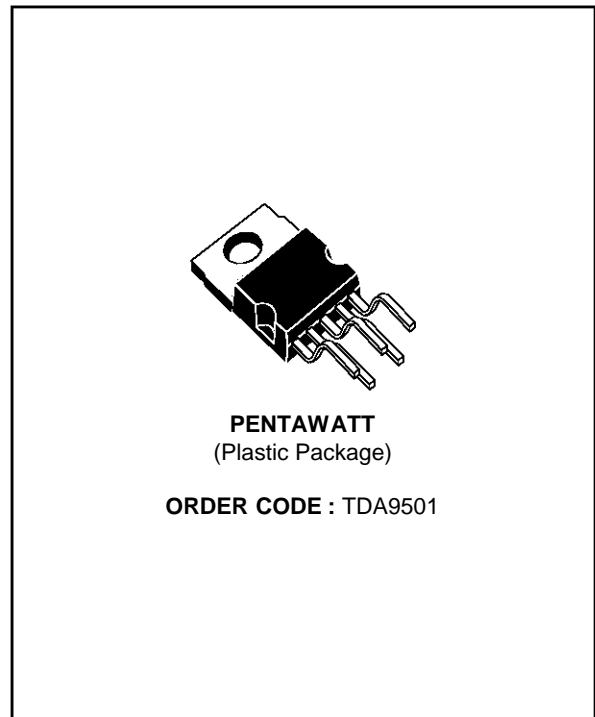

AC COUPLING HIGH VOLTAGE VIDEO AMPLIFIER

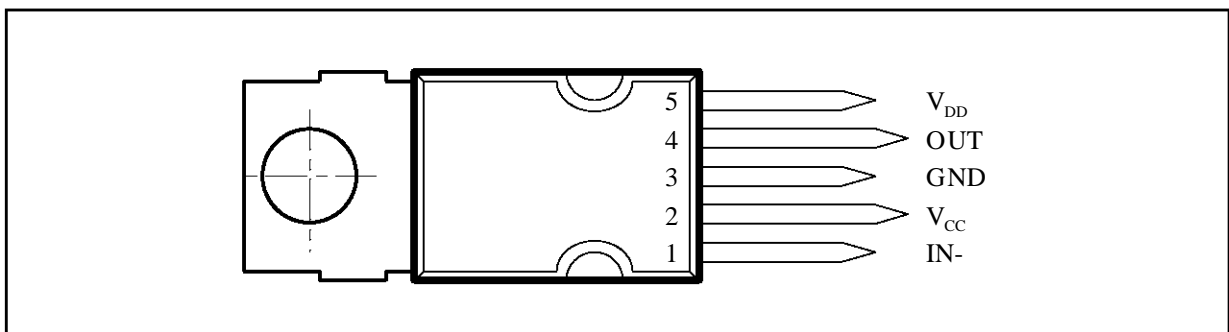
- BANDWIDTH : 40MHz TYPICAL
- RISE AND FALL TIME : 9ns TYPICAL
- SUPPLY VOLTAGE : 90V
- POWER DISSIPATION : 2.3W



DESCRIPTION

The TDA9501 includes a video amplifier designed with a high voltage bipolar/CMOS/DMOS technology (BCD). It drives directly one cathode of a monitor and is protected against flashovers. It is available in pentawatt package.

PIN CONNECTIONS

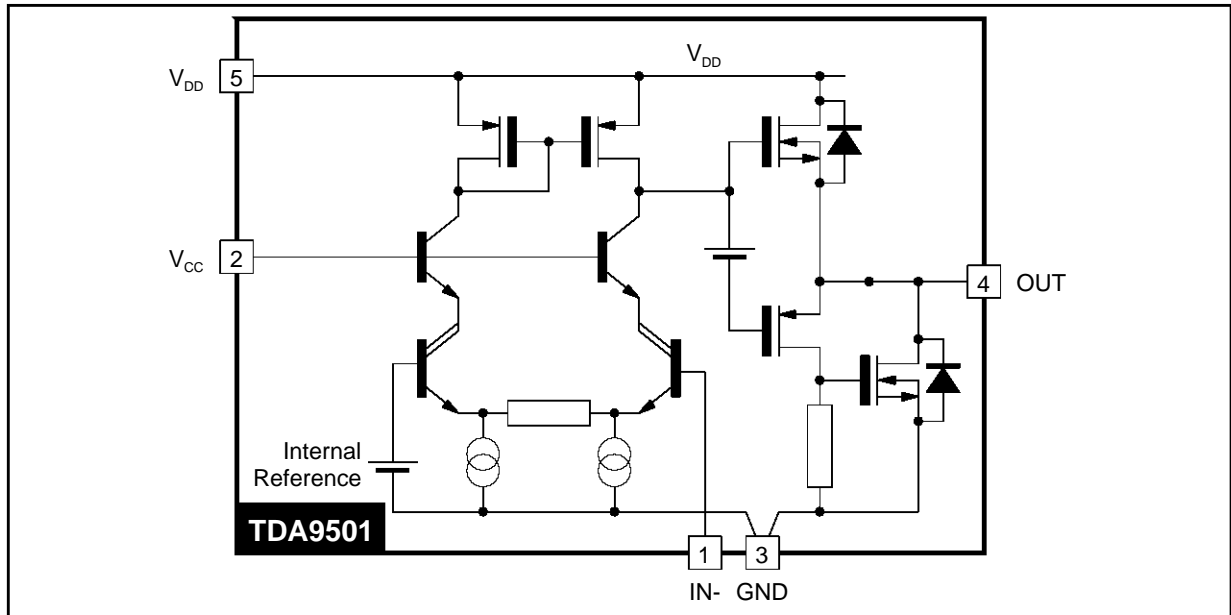


PIN CONFIGURATION

| Pin N | Symbol | Function |
|-------|-----------------|--------------------------------|
| 1 | IN- | Input of the amplifier |
| 2 | V _{CC} | Low Voltage Power Supply |
| 3 | GND | Also connected to the heatsink |
| 4 | OUT | Output driving the cathode |
| 5 | V _{DD} | High Voltage Power Supply |

TDA9501

BLOCK DIAGRAM



9501-02.EPS

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|----------------------|--|-----------------|--------------|
| V_{OUT}, V_{DD} | Supply High Voltage (Pins 4-5) | 100 | V |
| V_{CC} | Supply Low Voltage (Pin 2) | 20 | V |
| I_{OD} I_{OG} | Output Current to V_{DD} (Pin 4) Output Current to Ground (Pin 4) (See note 1) | protected 80 | mA |
| I_i | Input Current (Pin 1) | 50 | mA |
| VESD | ESD Susceptibility - Human Body Model, 100pF Discharge through 1.5k Ω (see Note 2) - EIAJ Norm, 200pF Discharge through 0 Ω (see Note 3) | 2 | kV |
| | | 300 | V |
| T_j | Junction Temperature | 150 | $^{\circ}$ C |
| T_{oper} | Operating Ambient Temperature | 0, +70 | $^{\circ}$ C |
| T_{stg} | Storage Temperature | -20, +150 | $^{\circ}$ C |

9501-02.TBL

- Notes :**
1. Pulsed current $t \leq 50\mu s$.
 2. Except $V_{DD} = 800V$.
 3. Except V_{DD} & $V_{CC} = 120V$.

THERMAL DATA

| Symbol | Parameter | Value | Unit |
|---------------|-------------------------------------|---------|----------------|
| $R_{th(j-c)}$ | Junction-Case Thermal Resistance | Max. 3 | $^{\circ}$ C/W |
| $R_{th(j-a)}$ | Junction-Ambient Thermal Resistance | Typ. 70 | $^{\circ}$ C/W |

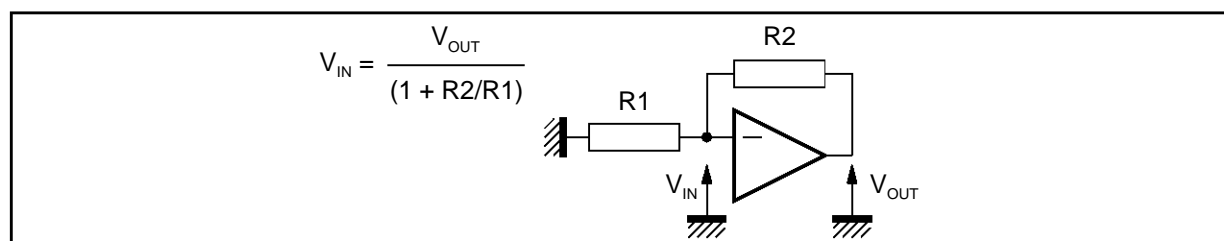
9501-03.TBL

ELECTRICAL CHARACTERISTICS ($V_{CC} = 12V$, $V_{DD} = 90V$, $T_{amb} = 25^{\circ}C$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------|---|--|------|----------------|------|-----------------|
| V_{DD} | High Supply Voltage (Pin 5) | | 30 | | 90 | V |
| V_{CC} | Low Supply Voltage (Pin 2) | | 10 | 12 | 15 | V |
| I_{DD} | High Voltage Supply Internal DC Current (without current due to the feedback network) | $V_{OUT} = 50V$ | | 10 | TBD | mA |
| I_{CC} | Low Voltage Supply Internal DC Current | | | 5.5 | | mA |
| V_{IN} | Input Voltage | See Figure 1 | 3.55 | 3.8 | 4.05 | V |
| dV_{IN}/dV_{CC} | Drift of Input Voltage versus V_{CC} | | | 0.15 | | % |
| dV_{IN}/dT | Drift of Input Voltage versus Temperature | See Note 4 | | 2 | | mV/ $^{\circ}C$ |
| V_{SATH} | High Output Saturation Voltage (Pin 4) | $I_{O} = -60mA$ | | $V_{DD} - 6.5$ | | V |
| V_{SATL} | Low Output Saturation Voltage (Pin 4) | $I_{O} = 60mA$ | | 17 | | V |
| BW | Bandwidth at -3dB | Measured on CRT cathodes. $C_{LOAD} = 10pF$, $R_{protect} = 200\Omega$, Gain = 20 $V_{OUT} = 50V$, $\Delta V_{OUT} = 20V_{PP}$ | | 40 | | MHz |
| t_R , t_F | Rise and Fall Time | Measured between 10% & 90% of output pulse, $C_{LOAD} = 10pF$, $R_{protect} = 200\Omega$, Gain = 20 $V_{OUT} = 50V$, $\Delta V_{OUT} = 40V_{PP}$ | | 9 | | ns |
| G_O | Open Loop Gain | $V_{OUT} = 50V$ | TBD | 57 | | dB |
| I_{IB} | Input Bias Current (Pin 1) | $V_{OUT} = 50V$ | | 10 | | μA |
| R_{IN} | Input Resistance | See Note 4 | TBD | 200 | | k Ω |

Note 4 : Characterized and not tested.

Figure 1 : Measurement of Input Voltage



9501-04.TBL

9501-03.EPS

TYPICAL APPLICATION

- The TDA9501 is composed of different parts :
- A differential amplifier, with active load.
 - An output buffer designed with DMOS transistors.
 - An integrated voltage reference.

PC board lay-out

The best performances of the high voltage video amplifier will be obtained only with a carefully designed PC board. Output to input capacitances are of particular importance. For a single amplifier, the input-output capacitance, in parallel with the relatively high feedback resistance, leads to an integrator response. This parasitic capacitor has to be compensated by another capacitor connected in parallel on input serial gain resistor. A well matched compensation allows to use the full bandwidth of the TDA9501. In other cases the system has an integrator response with lower bandwidth, or a differentiator response with too much ringing.

A low parasitic capacitance (0.3pF) feedback resistor and HF isolated printed wires are necessary.

Power dissipation

The power dissipation consists of a static part and a dynamic part. The static dissipation varies with the output voltage and the feedback resistor. The dynamic power dissipation increases with the pixel frequency.

For a signal frequency of 40MHz and 40V_{PP} output signal, the typical power dissipation is about 2.3W, for V_{DD} = 90V.

In first approximation, the dynamic dissipation is :

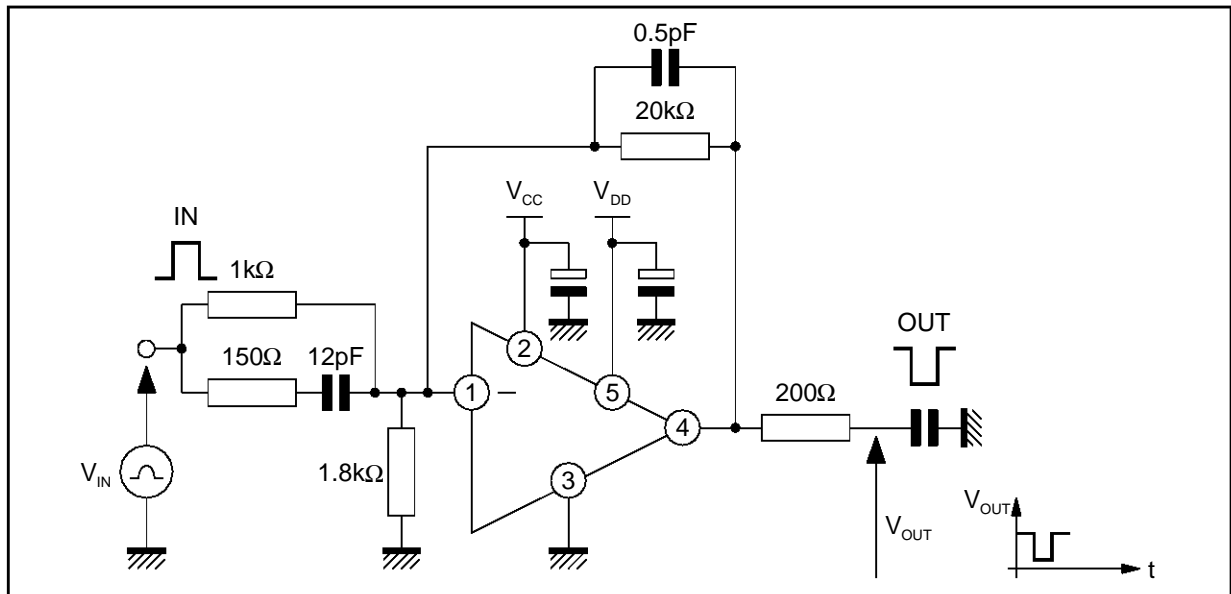
$$P_D = V_{DD} * C_{LOAD} * \Delta V_{OUT} * f$$

and the total dissipation is :

$$P = V_{DD} * C_{LOAD} * \Delta V_{OUT} * f + V_{DD} * I_{DD} + V_{CC} * I_{CC} - (V_{DD} - V_{OUT}) \frac{V_{OUT}}{R_{FEEDBACK}}$$

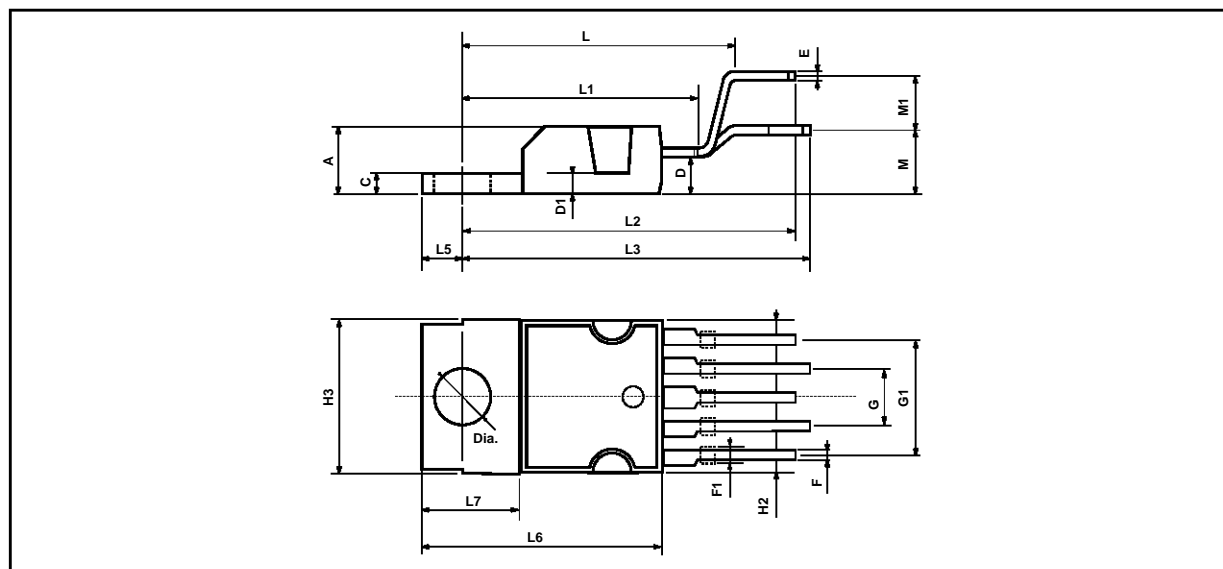
with f = pixel frequency

Figure 2 : Typical Evaluation Schematic



9501-04.EPS

PACKAGE MECHANICAL DATA : 5 PINS - PLASTIC PENTAWATT



PMPENTVPEPS

| Dimensions | Millimeters | | | Inches | | |
|------------|-------------|-------|------|--------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 4.8 | | | 0.189 |
| C | | | 1.37 | | | 0.054 |
| D | 2.4 | | 2.8 | 0.094 | | 0.110 |
| D1 | 1.2 | | 1.35 | 0.047 | | 0.053 |
| E | 0.35 | | 0.55 | 0.014 | | 0.022 |
| F | 0.8 | | 1.05 | 0.031 | | 0.041 |
| F1 | 1 | | 1.4 | 0.039 | | 0.055 |
| G | | 3.4 | | 0.126 | 0.134 | 0.142 |
| G1 | | 6.8 | | 0.260 | 0.268 | 0.276 |
| H2 | | | 10.4 | | | 0.409 |
| H3 | 10.05 | | 10.4 | 0.396 | | 0.409 |
| L | | 17.85 | | | 0.703 | |
| L1 | | 15.75 | | | 0.620 | |
| L2 | | 21.4 | | | 0.843 | |
| L3 | | 22.5 | | | 0.886 | |
| L5 | 2.6 | | 3 | 0.102 | | 0.118 |
| L6 | 15.1 | | 15.8 | 0.594 | | 0.622 |
| L7 | 6 | | 6.6 | 0.236 | | 0.260 |
| M | | 4.5 | | | 0.177 | |
| M1 | | 4 | | | 0.157 | |
| Dia | 3.65 | | 3.85 | 0.144 | | 0.152 |

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