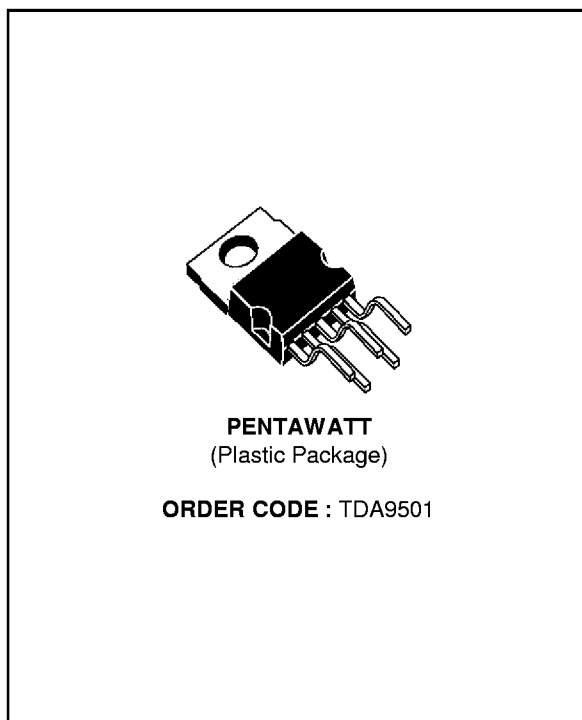


AC COUPLING HIGH VOLTAGE VIDEO AMPLIFIER

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

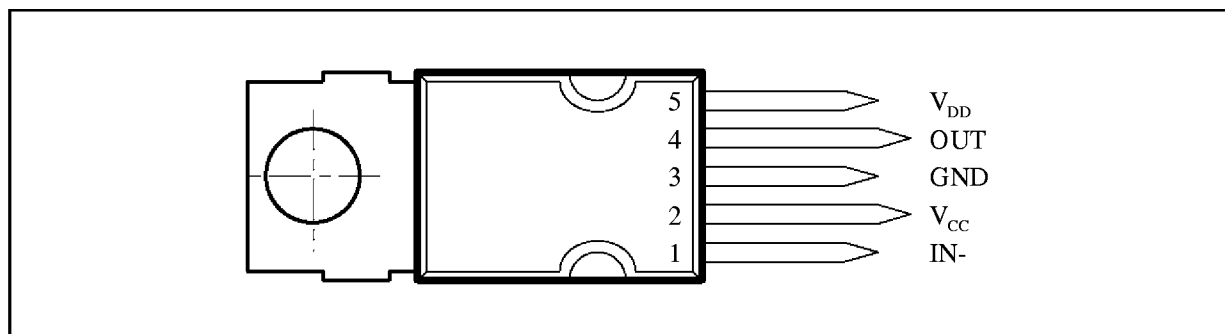
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DESCRIPTION

The TDA9501 is a video amplifier designed with a high voltage Bipolar/CMOS/DMOS technology (BCD). It drives in AC coupling mode one cathode of a monitor and is protected against flashovers. It is available in Pentawatt package.

PIN CONNECTIONS



9501-01.EPS

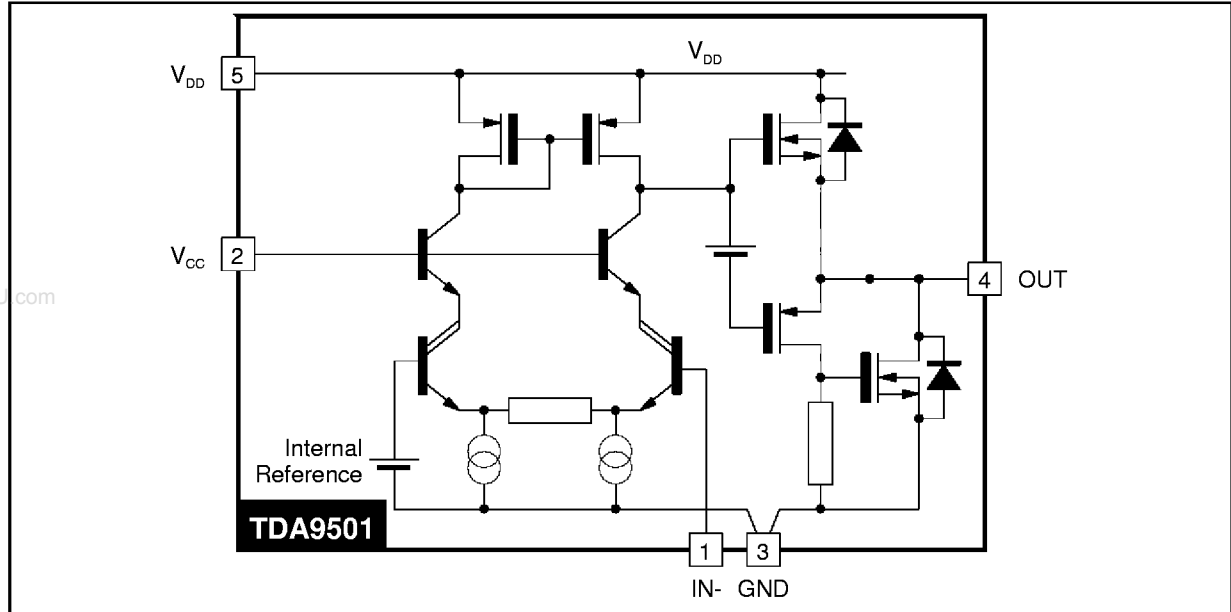
PIN CONFIGURATION

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

9501-01.TBL

TDA9501

BLOCK DIAGRAM



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_j	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	$^{\circ}\text{C}$
T_{oper}	Operating Ambient Temperature	0, +70	$^{\circ}\text{C}$
T_{stg}	Storage Temperature	-20, +150	$^{\circ}\text{C}$

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

THERMAL DATA

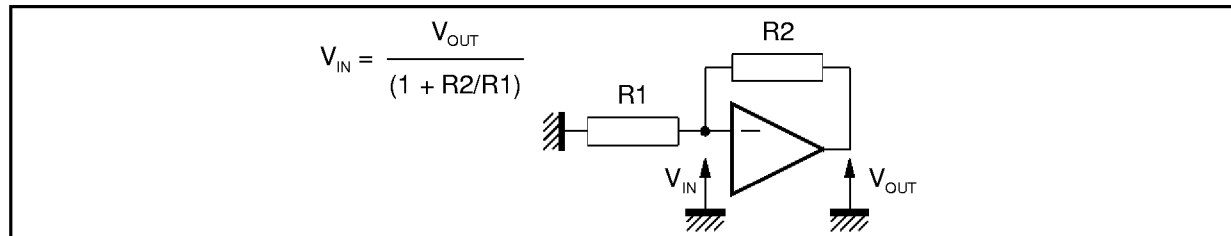
Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-Case Thermal Resistance	Max. 3	$^{\circ}\text{C/W}$
$R_{th(j-a)}$	Junction-Ambient Thermal Resistance	Typ. 70	$^{\circ}\text{C/W}$

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	15	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/°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
ELin	Linearity Error	$17V < V_{OUT} < V_{DD} - 15V$		5	8	%
OS	Overshoot			5		%
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	$V_{OUT} = 50V$		57		dB
I_{IB}	Input Bias Current (Pin 1)	$V_{OUT} = 50V$		10		μA
R_{IN}	Input Resistance	See Note 4		200		k Ω

Note 4 : Characterized and not tested.

Figure 1 : Measurement of Input Voltage



TYPICAL APPLICATION

The TDA9501 consists of :

- A differential amplifier with active load,
- A DMOS output buffer,
- A bandgap voltage reference.

PC board lay-out

The best performances are obtained with a carefully designed HF PC-Board, especially for the output and input capacitors.

The feedback resistor R_F must have a low parasitic capacitor ($C_F < 0.3pF$).

This parasitic capacitor C_F must be compensated by a capacitor R_3 (roughly $20 \cdot C_F$) connected in parallel with the input resistor R_1 .

The full bandwidth of the device is only obtained with well matched compensation otherwise the application will have either an integrator response with a low bandwidth or a differentiator response with too much ringing.

A diode D_P (see Figure 2) has to be connected for flashover protection.

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 3.0W, for $V_{DD} = 110V$.

In first approximation, the dynamic dissipation is :

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

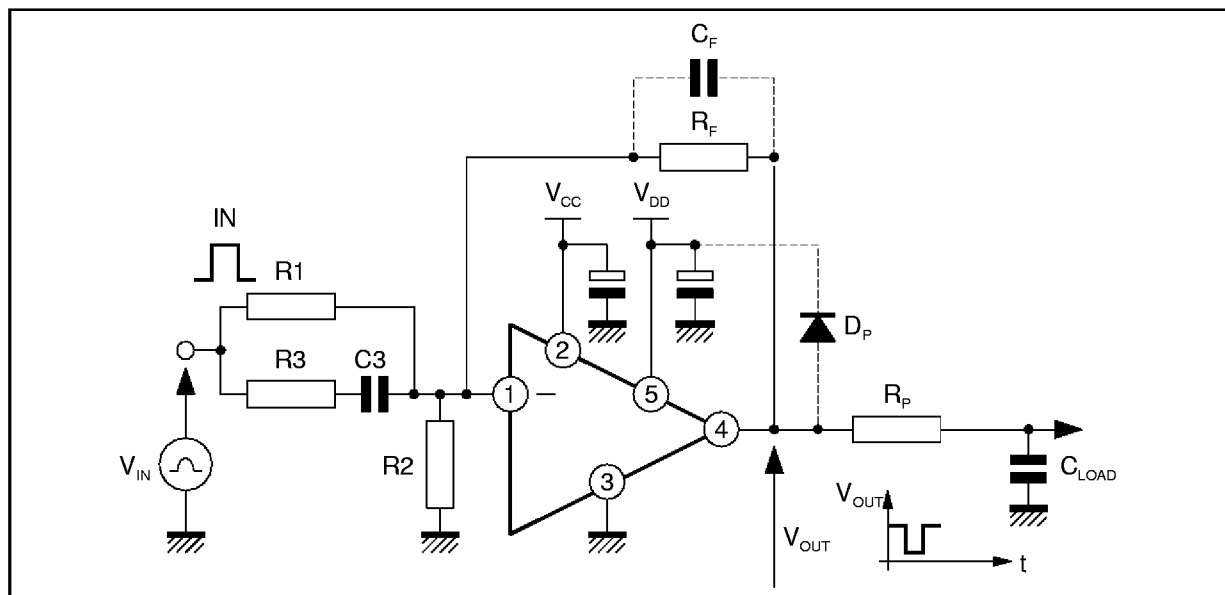
and the total dissipation is :

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

with $f =$ pixel frequency

$$P = 110V \times 10pF \times 40V \times 40MHz + 110V \times 7mA + 12 \times 20mA - 60^2V/20k\Omega = 2.95W$$

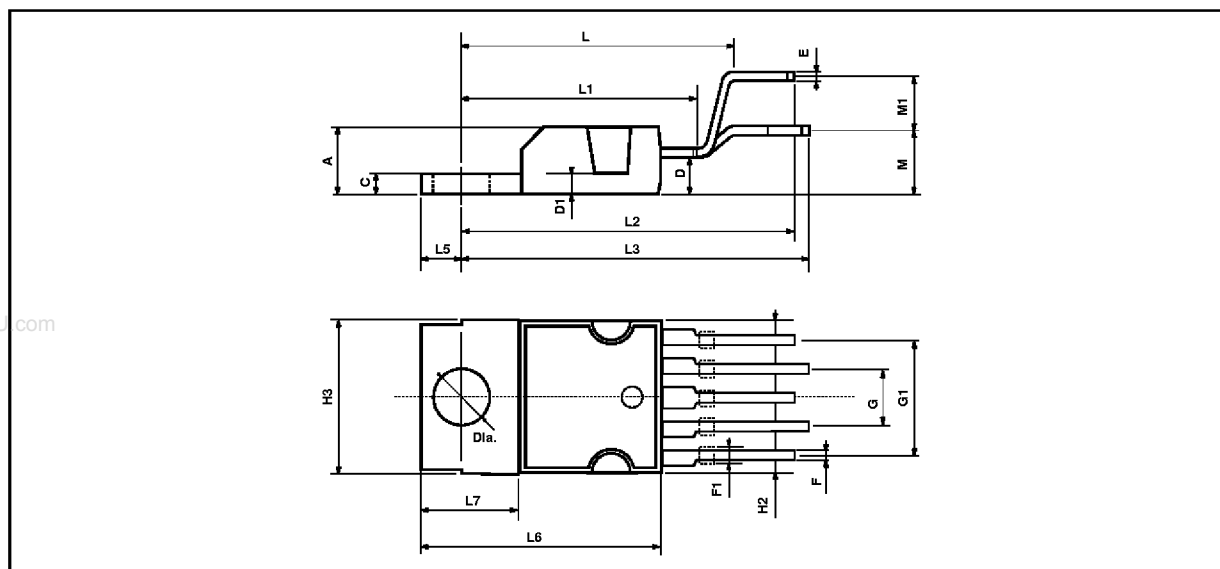
Figure 2 : Typical Evaluation Schematic



Recommended values :

- $R_1 = 1k\Omega$, $R_2 = 1.8k\Omega$, $R_F = 20k\Omega$, $R_P = 200\Omega$,
- $C_3 = 10$ to $12pF$ for $C_F \# 0.5pF$.
- $R_3 \# 150\Omega$.

PACKAGE MECHANICAL DATA : 5 PINS - PLASTIC PENTAWATT



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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