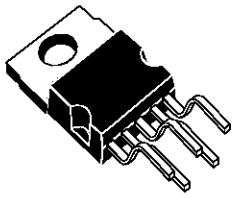
SGS-THOMSON MICROELECTRONICS

TDA9501

AC COUPLING HIGH VOLTAGE VIDEO AMPLIFIER

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



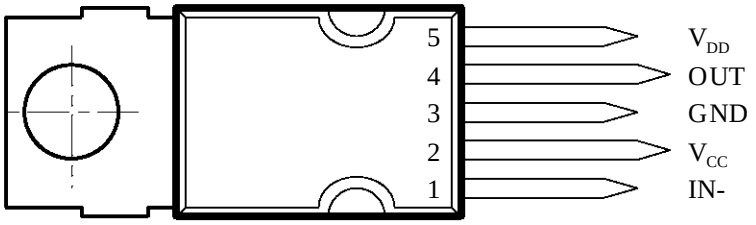
PENTAWATT
(Plastic Package)

ORDER CODE : TDA9501

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



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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

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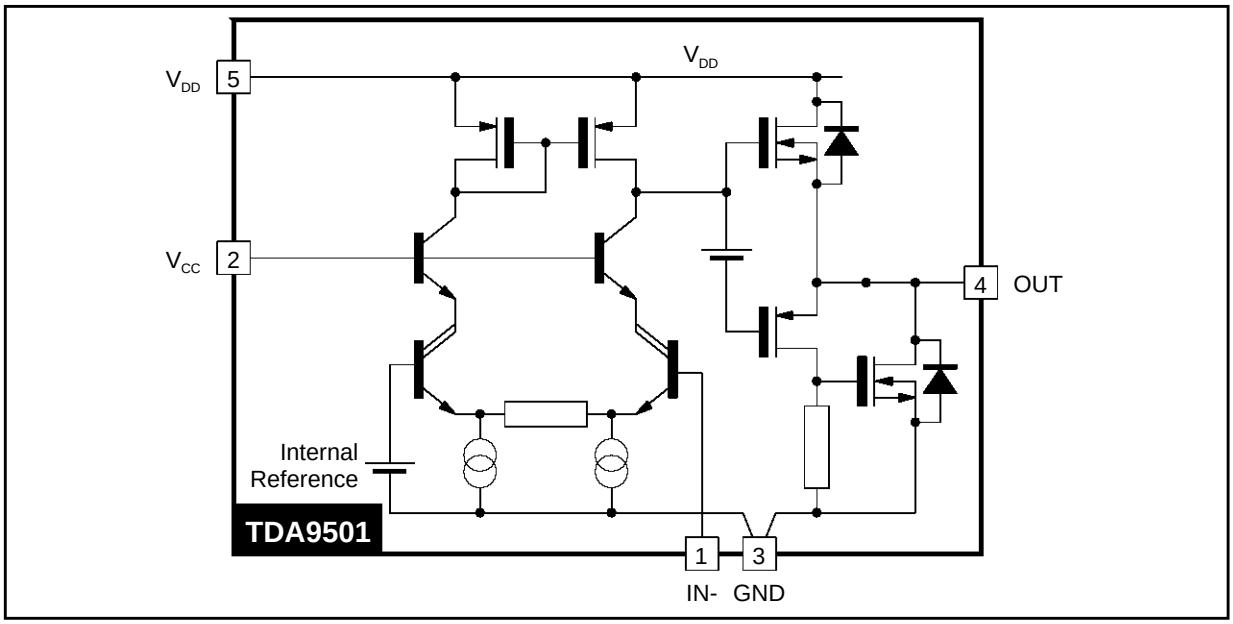
BLOCK DIAGRAM



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 1.5kΩ (see Note 2) - EIAJ Norm, 200pF Discharge through 0Ω (see Note 3)	 2 300	 kV V
T_j	Junction Temperature	150	°C
T_{oper}	Operating Ambient Temperature	0, +70	°C
T_{stg}	Storage Temperature	-20, +150	°C

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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	°C/W
$R_{th\ (j-a)}$	Junction-Ambient Thermal Resistance	Typ.	70	°C/W

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ELECTRICAL CHARACTERISTICS (V_{CC} = 12V, V_{DD} = 90V, T_{amb} = 25°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/°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, Rprotect = 200Ω, Gain = 20 V_{OUT}= 50V, ΔV_{OUT} = $20V_{PP}$		40		MHz
t_R, t_F	Rise and Fall Time	Measured between 10% & 90% of output pulse, C_{LOAD} = 10pF, Rprotect = 200Ω, Gain = 20 V_{OUT} = 50V, ΔV_{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		kΩ

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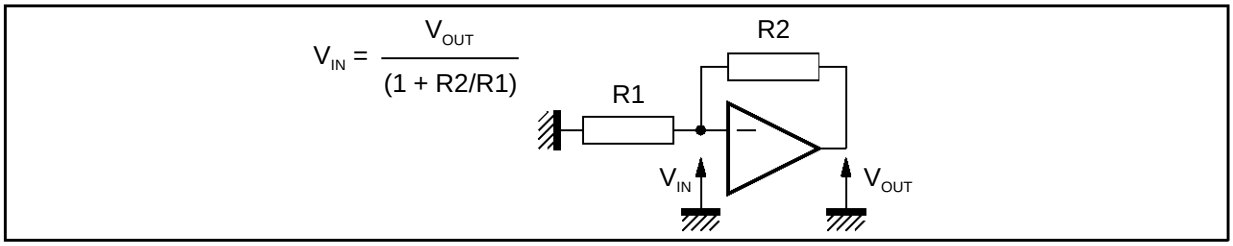
Note 4 : Characterized and not tested.

Figure 1 : Measurement of Input Voltage



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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 imput 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 :

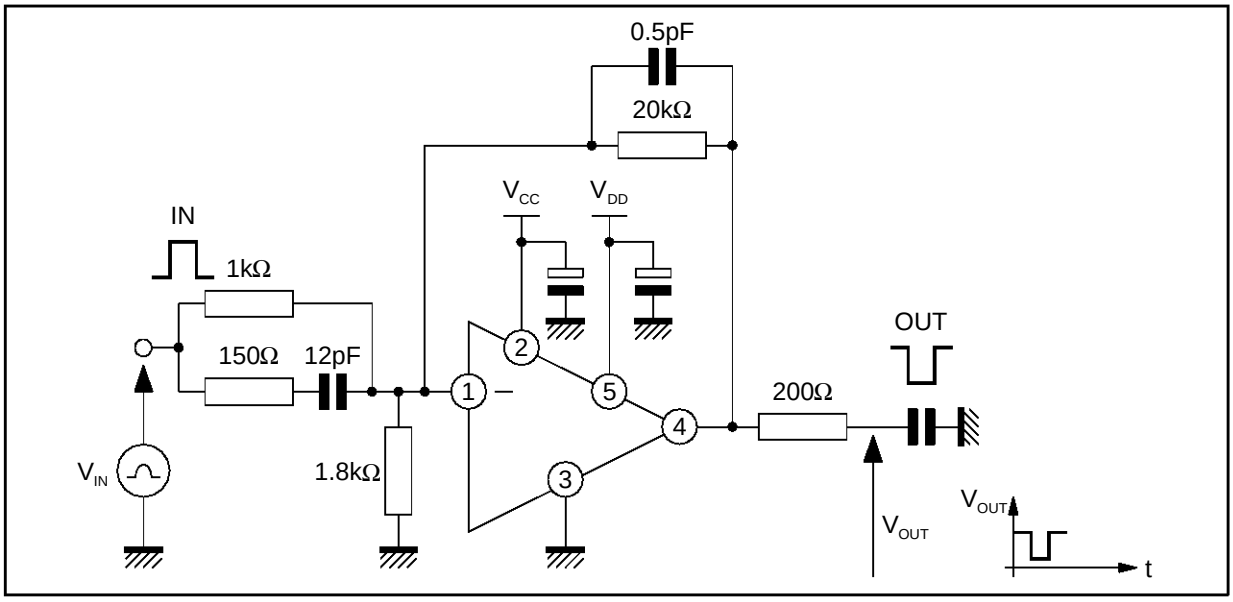
$$P_D = V_{DD} * C_{LOAD} * \Delta V_{OUT} * f$$

and the total dissipation is :

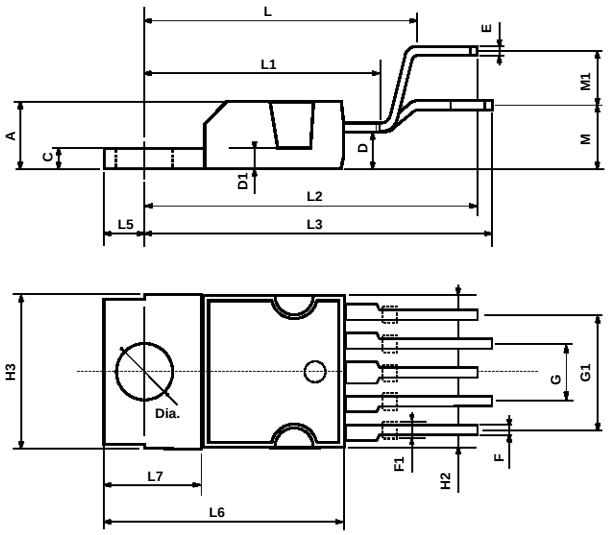
$$P = V_{DD} * C_{LOAD} * \Delta V_{OUT} * f + V_{DD} * I_{DD} + V_{CC} * I_{CC} - (V_{DD} - \overline{V_{OUT}}) \frac{\overline{V_{OUT}}}{R_{FEEDBACK}}$$

with f = pixel frequency

Figure 2 : Typical Evaluation Schematic



PACKAGE MECHANICAL DATA : 5 PINS - PLASTIC PENTAWATT



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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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