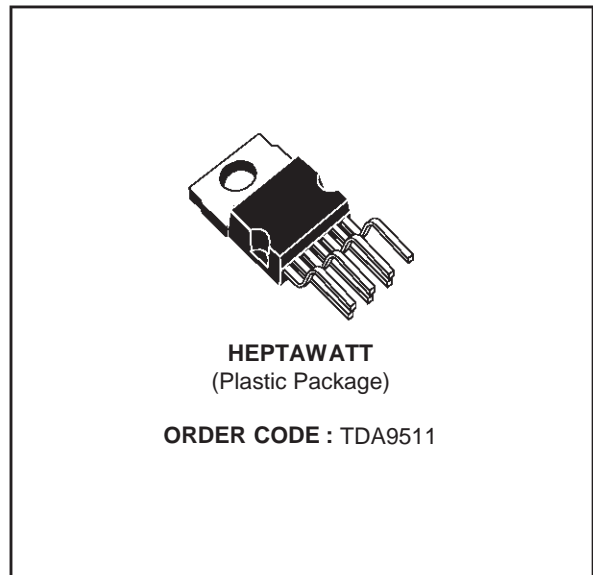


DC COUPLING HIGH VOLTAGE VIDEO AMPLIFIER

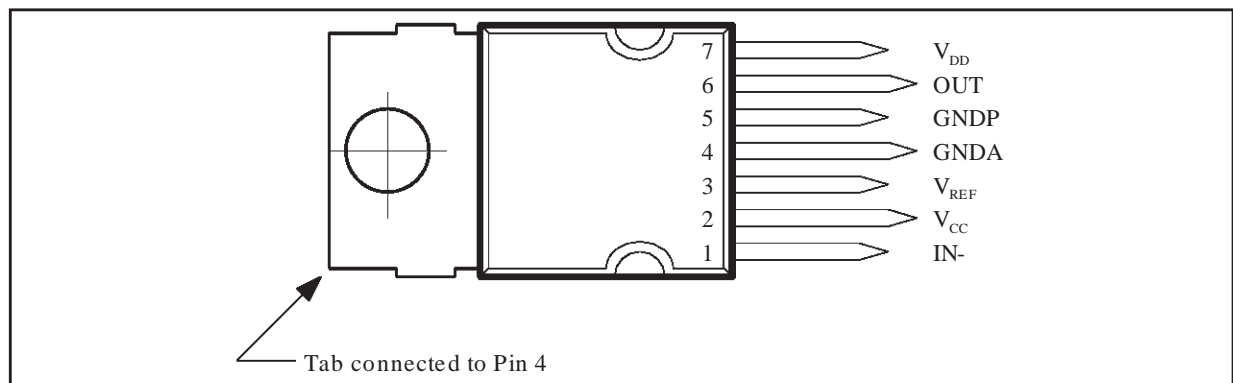
- BANDWIDTH : 40MHz TYPICAL
- RISE AND FALL TIME : 9ns TYPICAL
- SUPPLY VOLTAGE : 110V
- POWER DISSIPATION : 3.0W
- ESD PROTECTED

DESCRIPTION

The TDA9511 is a video amplifier designed with a high voltage Bipolar/CMOS/DMOS technology (BCD). It drives in DC coupling mode one cathode of a monitor and is protected against flashovers. It is available in Heptawatt package.



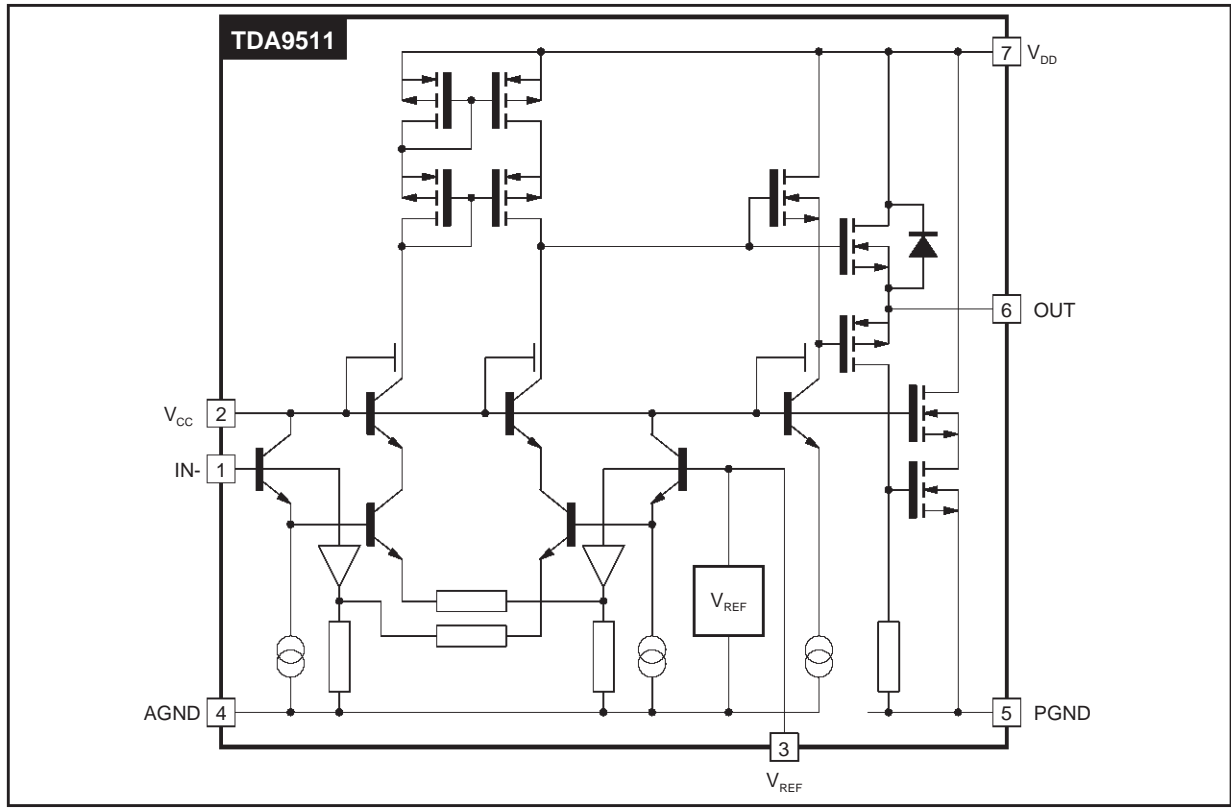
PIN CONNECTIONS



PIN CONFIGURATION

Pin N	Symbol	Function
1	IN-	Input of the amplifier
2	V _{CC}	Low Voltage Power Supply (12V Typ.)
3	V _{REF}	Internal Voltage Reference (3.3V)
4	GNDA	Analog Ground
5	GNDP	Power Ground
6	OUT	Output driving the cathode
7	V _{DD}	High Voltage Power Supply (110V Max.)

BLOCK DIAGRAM



9511-02.EPS

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DD}	Supply High Voltage (Pin 7)	120	V
V _{CC}	Supply Low Voltage (Pin 2)	20	V
VESD	ESD Susceptibility Human Body Model, 100pF Discharge through 1.5kΩ EIAJ Norm, 200pF Discharge through 0Ω	2 300	kV V
I _{OD} I _{OG}	Output Current to V _{DD} (Pin 6) Output Current to Ground (Pin 6) (see Note 1)	protected 80	mA
I _j	Input Current (Pin 1)	50	mA
T _j	Junction Temperature	150	°C
T _{oper}	Operating Ambient Temperature	0, +70	°C
T _{stg}	Storage Temperature	-20, +150	°C

Note 1 : Pulsed current t ≤ 50μs

9511-02.TBL

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

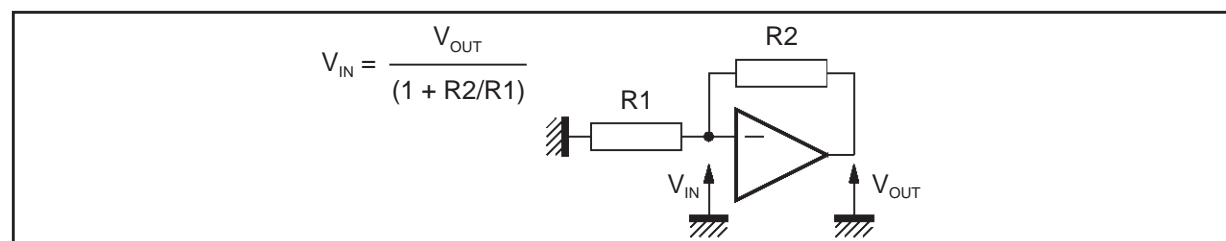
9511-03.TBL

ELECTRICAL CHARACTERISTICS ($V_{CC} = 12V$, $V_{DD} = 110V$, $T_{amb} = 25^{\circ}C$, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{DD}	High Supply Voltage (Pin 7)		20		110	V
V_{CC}	Low Supply Voltage (Pin 2)		10	12	15	V
I_{DD}	DC Current of High Voltage Supply (without feedback current)	$V_{OUT} = 60V$		9		mA
I_{CC}	Low Voltage Supply Internal DC Current			15		mA
V_{REF}	Internal Reference (Pin 3)			3.2		V
V_{IN}	Input Voltage	$V_{OUT} = 60V$		3.25		V
dV_{IN}/dV_{CC}	Drift of Input Voltage versus V_{CC}	Measured on Pin 1		0.12		%
dV_{IN}/dT	Drift of Input Voltage versus Temperature			0.5		mV/ $^{\circ}C$
V_{SATH}	High Output Saturation Voltage (Pin 6)	$I_O = -60mA$		$V_{DD} - 8.5$		V
V_{SATL}	Low Output Saturation Voltage (Pin 6)	$I_O = 60mA$		12		V
ELin	Linearity Error	$17V < V_{OUT} < V_{DD} - 15V$			5	%
OS	Overshoot			5		%
BW	Bandwidth at -3dB	Measured on CRT cathodes. $C_{LOAD} = 10pF$, $R_{protect} = 220\Omega$, $V_{OUT} = 60V$, $\Delta V_{OUT} = 20V_{PP}$, Feedback gain = 20		40		MHz
t_R, t_F	Rise and Fall Time	Measured between 10% & 90% of output pulse, $C_{LOAD} = 10pF$, $R_{protect} = 220\Omega$, $V_{OUT} = 60V$, $\Delta V_{OUT} = 40V_{PP}$		9		ns
G_O	Open Loop Gain	$V_{OUT} = 60V$		60		dB
	Open Loop Gain Temperature Coefficient			0.03		dB/ $^{\circ}C$
I_{IB}	Input Bias Current (Pin 1)	$V_{OUT} = 60V$		20	30	μA
	Input Bias Temperature Coefficient			90		nA/ $^{\circ}C$
R_{IN}	Input Resistance	See Note 2		200		k Ω

Note 2 : Characterized and not tested.

Figure 1 : Measurement of Input Voltage



TYPICAL APPLICATION

The TDA9511 consists of :

- A differential amplifier with active load,
- A DMOS output buffer,
- A bandgap voltage reference (Pin 3 for filtering only).

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 ($C_F < 0.3\text{pF}$).

This parasitic capacitor C_F must be compensated by a capacitor $R3$ (roughly $20 \cdot C_F$) connected in parallel with the input resistor $R1$.

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 $V_{DD} = 110\text{V}$.

In first approximation, the dynamic dissipation is :

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

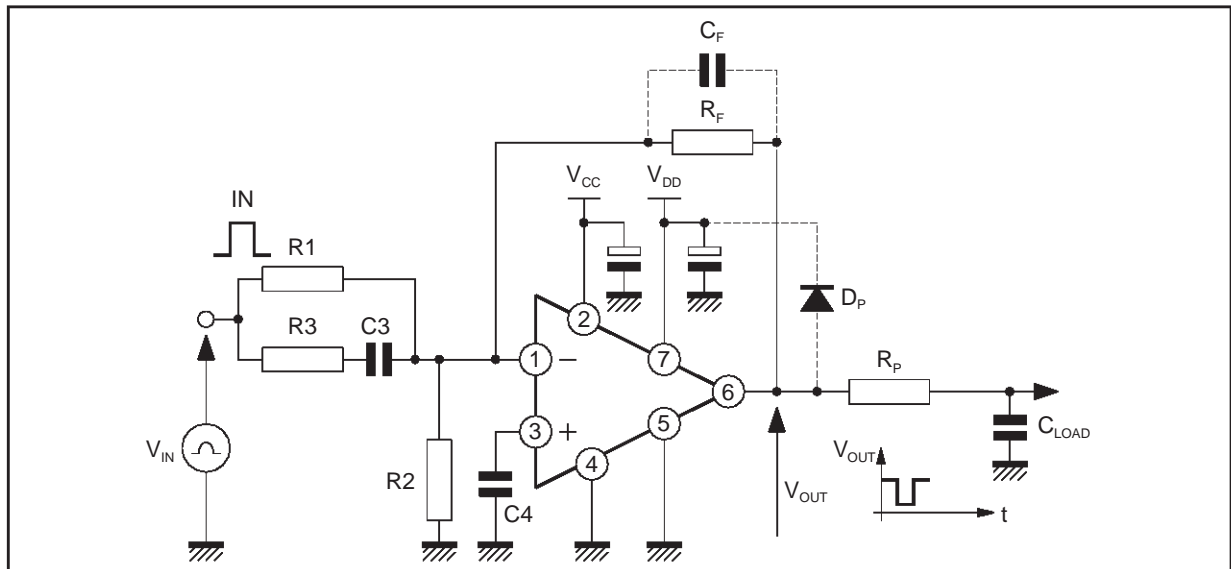
and the total dissipation is :

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

with $f =$ pixel frequency

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

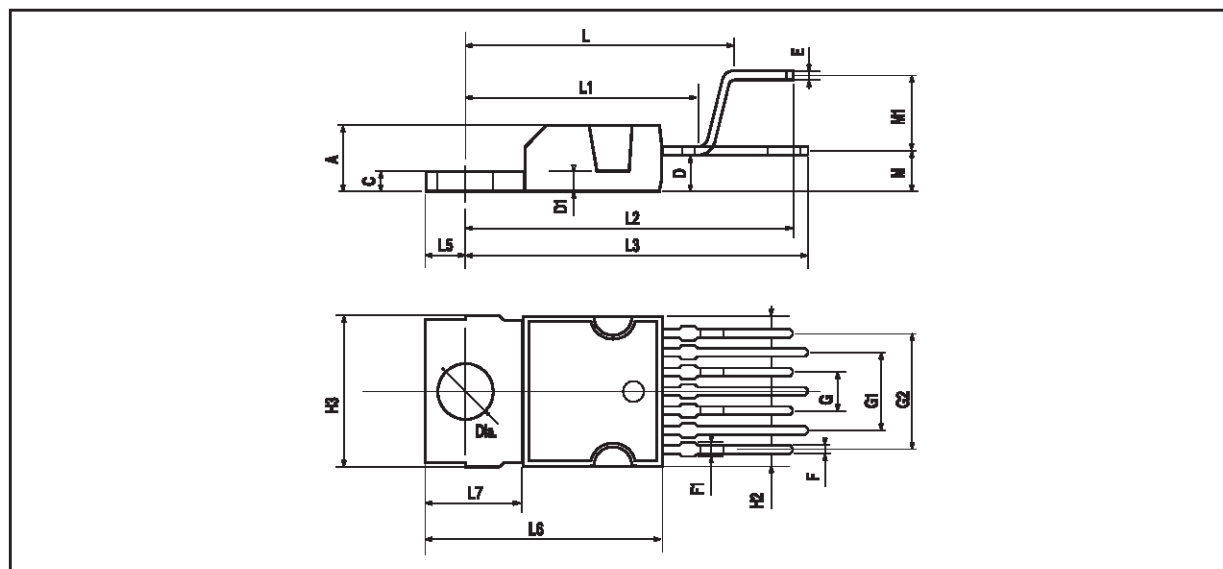
Figure 2 : Typical Evaluation Schematic



Recommended values :

- $R1 = 1\text{k}\Omega$, $R2 = 1.8\text{k}\Omega$, $R_F = 20\text{k}\Omega$, $R_P = 200\Omega$,
- $C4 > 10\text{nF}$, $C3 = 10$ to 12pF for $C_F \# 0.5\text{pF}$.
- $R3 \# 150\Omega$.

PACKAGE MECHANICAL DATA : 7 PINS - PLASTIC HEPTAWATT



PM-HEPTV.EPS

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	0.6		0.8	0.024		0.031
F1			0.9			0.035
G	2.41	2.54	2.67	0.095	0.100	0.105
G1	4.91	5.08	5.21	0.193	0.200	0.205
G2	7.49	7.62	7.8	0.295	0.300	0.307
H2			10.4			0.409
H3	10.05		10.4	0.396		0.409
L		16.97			0.668	
L1		14.92			0.587	
L2		21.54			0.848	
L3		22.62			0.891	
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		2.8			0.110	
M1		5.08			0.200	
Dia.	3.65		3.85	0.144		0.152

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