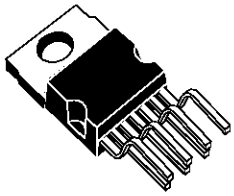
SGS-THOMSON MICROELECTRONICS

TDA9511

DC COUPLING HIGH VOLTAGE VIDEO AMPLIFIER

ADVANCE DATA

- BANDWIDTH : 45MHz TYPICAL
- RISE AND FALL TIME : 8ns TYPICAL
- SUPPLY VOLTAGE : 120V
- FLASH-OVER PROTECTION
- POWER DISSIPATION : 3.0W
- ESD PROTECTED



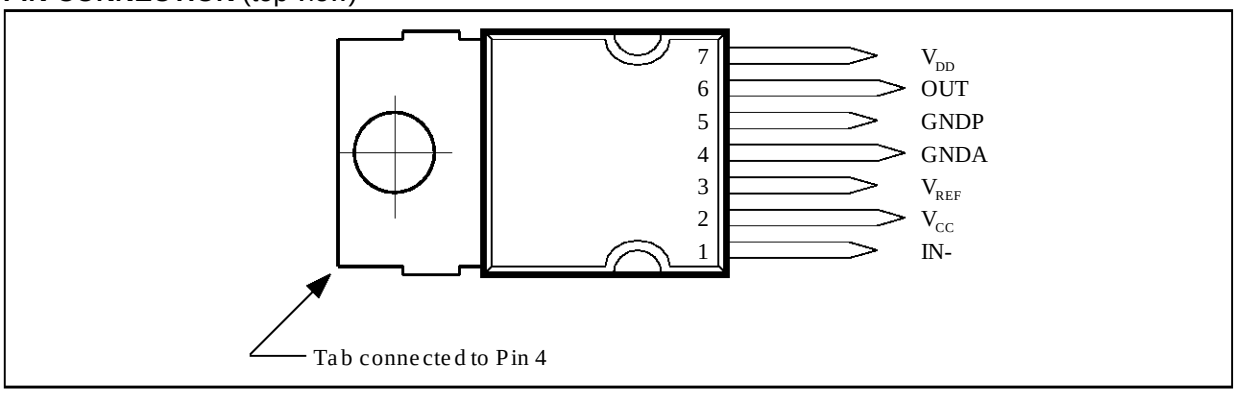
HEPTAWATT
(Plastic Package)

ORDER CODE : TDA9511

DESCRIPTION

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

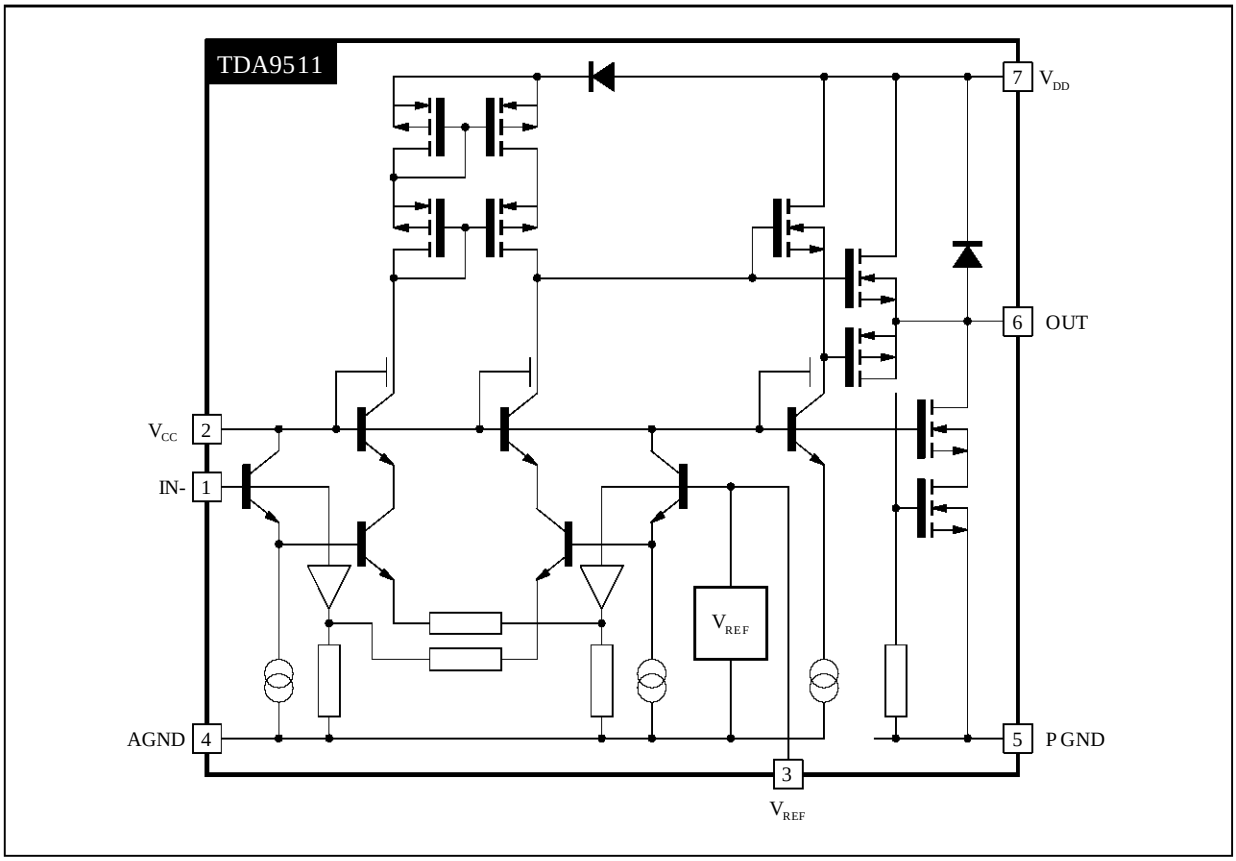
PIN CONNECTION (top view)



PIN CONFIGUATION

Pin N°	Symbol	Function
1	IN-	Input of the amplifier. It is a virtual ground with 3.5V bias voltage and 10µA input bias current.
2	V_{CC}	Low Voltage Power Supply (12V Typ.)
3	V_{REF}	Internal Voltage Reference (3.1V)
4	GNDA	Analog Ground
5	GNDP	Power Ground
6	OUT	Output driving the cathode. Pin 6 is internally protected against CRT arc discharges by a diode limiting the output voltage to V_{DD}.
7	V_{DD}	High Voltage Power Supply (120V Max.)

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}	Supply High Voltage (Pin 7)	130	V
V_{CC}	Supply Low Voltage (Pin 2)	20	V
I_{OD} I_{OG}	Output Current to VDD (Pin 6) Output Current to Ground (Pin 6) ($T_j = T_{j\ Max.}$)	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

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

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 7)		20		120	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		6	TBD	mA
I_{CC}	Low Voltage Supply Internal DC Current			20		mA
V_{REF}	Internal Reference (Pin 3)			3.1		V
dV_{REF}/d_{VCC}	Drift of Reference Voltage versus V_{CC}			TBD		%
dV_{REF}/dT	Drift of Reference Voltage versus Temperature			TBD		mV/°C
V_{SATH}	High Output Saturation Voltage (Pin 6)	I_O = -60mA		V_{DD} - 15		V
V_{SATL}	Low Output Saturation Voltage (Pin 6)	I_O = 60mA		17		V
BW	Bandwidth at -3dB	Measured on CRT cathodes. C_{LOAD} = 10pF, $R_{protect}$ = 150Ω, V_{OUT} = 60V, ΔV_{OUT} = $40V_{PP}$, Feedback gain = 20		45		MHz
t_R, t_F	Rise and Fall Time	Measured between 10% & 90% of output pulse, C_{LOAD} = 10pF, $R_{protect}$ = 150Ω, V_{OUT} = 60V, ΔV_{OUT} = $40V_{PP}$		8		ns
G_O	Open Loop Gain			TBD		dB
	Open Loop Gain Temperature Coefficient			TBD		dB/°C
I_{IB}	Input Bias Current (Pin 1)	V_{OUT} = 60V		TBD		µA
	Input Bias Temperature Coefficient			TBD		nA/°C
R_{IN}	Input Resistance			200		kΩ

TYPICAL APPLICATION

The TDA9511 is composed of different parts :

– A differential amplifier, the gain of which is fixed by external feedback resistors ;
– An integrated voltage reference designed with a bandgap ;
– A protection diode against CRT arc discharges.

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, creates a pole in the closed-loop transfer function.
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 3.0W, for V_{DD} = 120V.

In first approximation, the dynamic dissipation is :

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

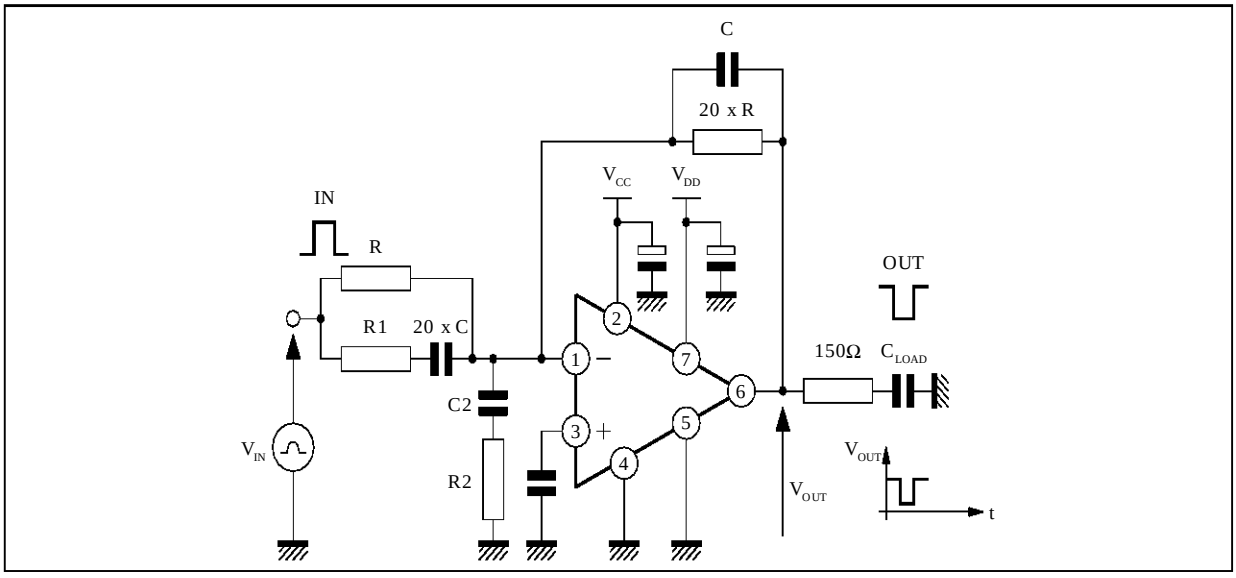
and the total dissipation is :

$$P = V_{DD} * C_{LOAD} * \Delta V_{OUT} * f + V_{DD} * I_{DD}$$

$$+ V_{CC} * I_{CC} - (V_{DD} - \overline{V}_{OUT}) \frac{\overline{V_{OUT}}}{R_{FEEDBAK}}$$

with f = pixel frequency

$$P = 120V \times 10pF \times 40V \times 40MHz + 120V \times 6mA + 12V \times 20\ mA - 60^2V/20k\Omega = 3.0W$$



R1 and R2 are in the range of some hundreds ohms.

C2 is in the range of some tens pF.

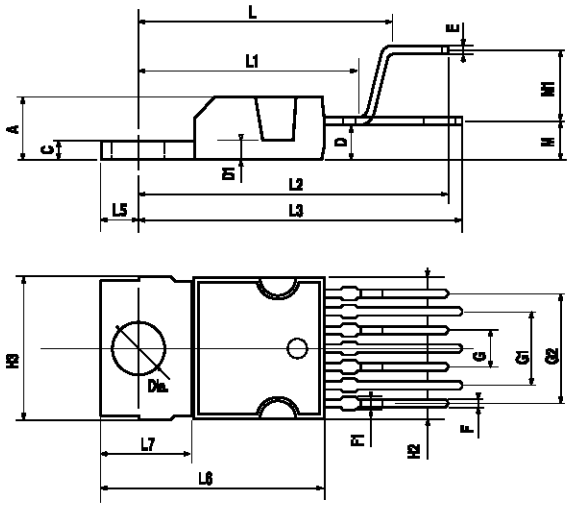
R is in the range of 1kΩ.

The DC feedback gain is from 15 to 30.

C must be lower than 1pF taking into account all the parasitic capacitors

PACKAGE MECHANICAL DATA

5 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