

RGB HIGH VOLTAGE VIDEO AMPLIFIER

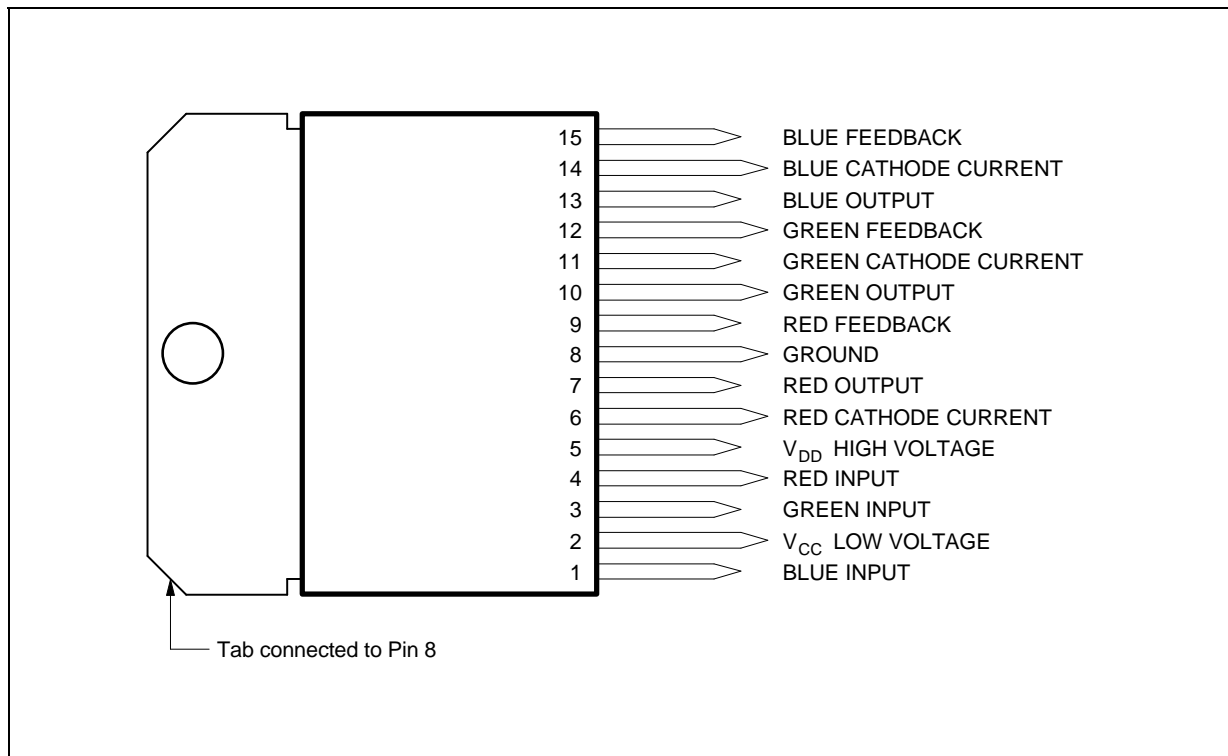
- BANDWIDTH : 8MHz TYPICAL
- SUPPLY VOLTAGE : 220V TYPICAL
- RISE AND FALL TIME : 50ns TYPICAL
- CRT CATHODE CURRENT OUTPUTS FOR PARALLEL OR SEQUENTIAL CUT-OFF OR DRIVE ADJUSTMENT
- FLASHOVER PROTECTION
- POWER DISSIPATION : 3.6W

DESCRIPTION

The STV5112 includes three video amplifiers designed with a high voltage bipolar/CMOS/DMOS technology (BCD). It drives directly the three cathodes and is protected against flashovers. Thanks to its three cathode current outputs, the STV5112 can be used with both parallel and sequential sampling applications.



PIN CONNECTIONS (top view)



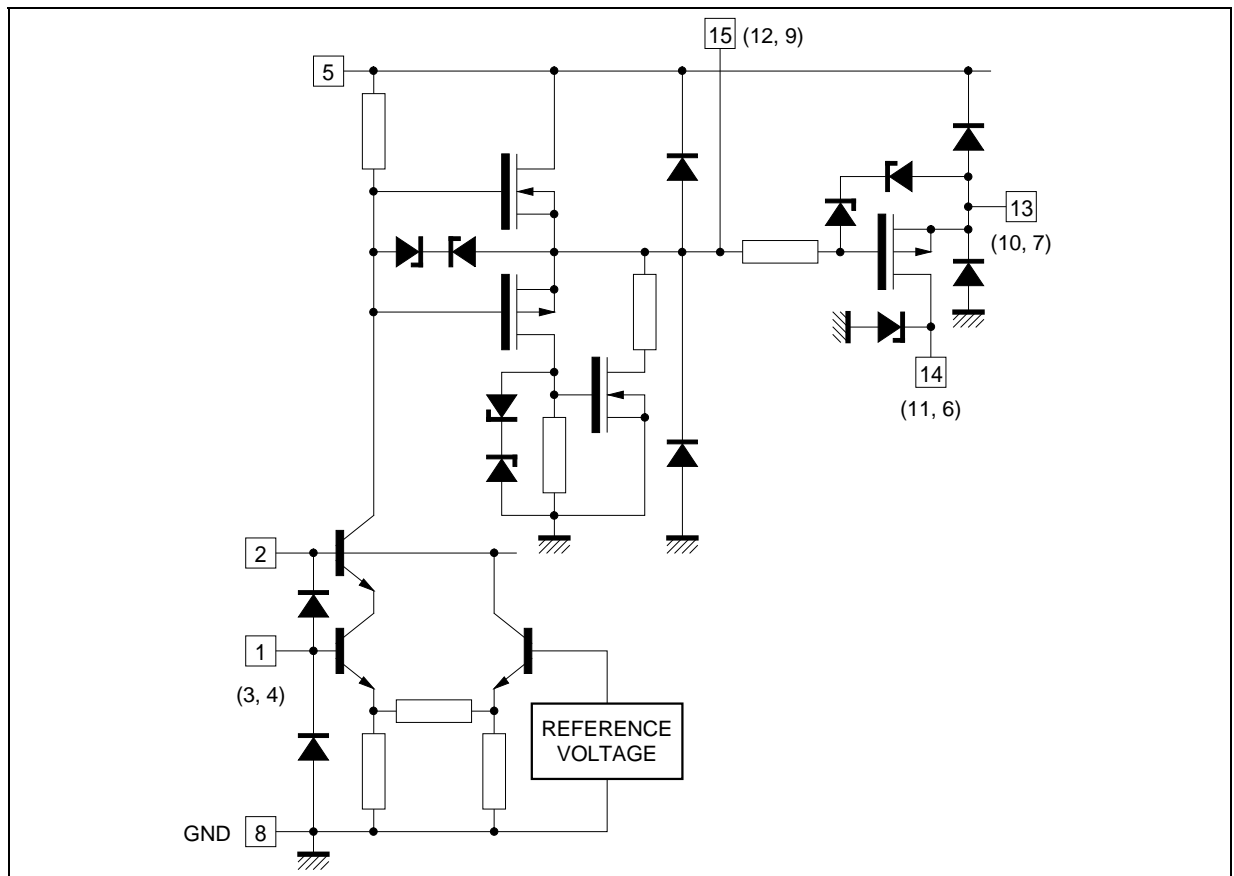
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PIN FUNCTION

N°	Function	Description
1	Blue Input	Input of the "blue" amplifier. It is a virtual ground with 2.5V bias voltage and 75µA input bias current.
2	V _{CC}	Low voltage power supply, typically 9V.
3	Green Input	Input of the "green" amplifier. It is a virtual ground with 2.5V bias voltage and 75µA input bias current.
4	Red Input	Input of the "red" amplifier. It is a virtual ground with 2.5V bias voltage and 75µA input bias current.
5	V _{DD}	High voltage power supply, typically 220V.
6	Red Cathode Current	Provides the video processor with a copy of the DC current flowing into the red cathode, for automatic cut-off or gain adjustment. If this control is not used, Pin 6 must be grounded.
7	Red Output	Output driving the red cathode. Pin 7 is internally protected against CRT arc discharges by a diode limiting the output voltage to V _{DD} .
8	Ground	Also connected to the heatsink.
9	Red Feedback	Output driving the feedback resistor network for the red amplifier.
10	Green Output	Output driving the green cathode. Pin 10 is internally protected against CRT arc discharges by a diode limiting the output voltage to V _{DD} .
11	Green Cathode Current	Provides the video processor with a copy of the DC current flowing into the green cathode, for automatic cut-off or gain adjustment. If this control is not used, Pin 11 must be grounded.
12	Green Feedback	Output driving the feedback resistor network for the green amplifier.
13	Blue Output	Output driving the blue cathode. Pin 13 is internally protected against CRT arc discharges by a diode limiting the output voltage to V _{DD} .
14	Blue Cathode Current	Provides the video processor with a copy of the DC current flowing into the blue cathode, for automatic cut-off or gain adjustment. If this control is not used, Pin 14 must be grounded.
15	Blue Feedback	Output driving the feedback resistor network for the blue amplifier.

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BLOCK DIAGRAM OF EACH CHANNEL



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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DD}	Supply High Voltage Pin 5	250	V
V _{CC}	Supply Low Voltage Pin 2	20	V
I _{OD} I _{OG}	Output Current to V _{DD} to Ground Pins 7 - 10 - 13	Protected 8	mA
I _{FD} I _{FG}	Output Current < 50μs duration to V _{DD} to Ground Pins 9 - 12 - 15	45 45	mA mA
I _j	Input Current Pins 1 - 3 - 4	60	mA
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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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.	35	°C/W

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ELECTRICAL CHARACTERISTICS

V_{CC} = 9V ; V_{DD} = 240V ; T_{amb} = 25°C ; AV = 55 (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V _{DD}	High Supply Voltage (Pin5)			220	240	V
V _{CC}	Low Supply Voltage (Pin 2)		7.5	9	10	V
I _{DD}	High Voltage Supply Internal DC Current (without current due to the feedback network)	V _{OUT} = 120V		9.5	15	mA
I _{CC}	Low Voltage Supply Internal DC Current			38	55	mA
V _{sath}	Output Saturation Voltage (High level) (Pins 7-10-13)	I _O = - 10μA		5		V
R _{ON}	Output Mos Transistor (Low level) (Pins 7-10-13)			1.7		kΩ
BW	Bandwidth at - 3dB	Measured on CRT cathodes. (C _{LOAD} = 10pF, R _{PROTECT} = 1kΩ, V _{OUT} = 120V, Δ V _{OUT} = 100V _{PP})		8		MHz
t _R , t _F	Rise & Fall Time	Measured between 10% & 90% of output pulse (C _{LOAD} = 10pF, R _{PROTECT} = 1kΩ, V _{OUT} = 120V, Δ V _{OUT} = 100V _{PP})		50		ns
G _O	Open Loop Gain		47	50		dB
	Open Loop Gain Difference between 2 channels		-1.5	0	1.5	dB
	Open Loop Gain Temperature Coefficient			0		dB/°C
P	Internal Power Dissipation (see calculation below)	V _{OUT} = 2MHz, 70V _{PP} sine wave, V _{BLACK} = 170V, C _L = 20pF, R _F = 68kΩ		3.6		W
V _{REF}	Internal Voltage Reference (Pins 1-3-4)	V _{OUT} = 120V	2.3	2.5	2.7	V
	Voltage Reference Temperature Coefficient			0		mV/°C
I _{IB}	Input Bias Current (Pins 1-3-4)	V _{OUT} = 120V		75		μA
R _I	Input Resistance			4		kΩ
ESD	ESD Human Body Model		1.2			kV

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TYPICAL APPLICATION

The STV5112 is composed of three independent amplifiers, each of them including :

- A differential amplifier, the gain of which is fixed by external feedback resistors,
- A voltage reference,
- A PMOS transistor providing a copy of the cathode current,
- A protection diode against CRT arc discharges.

PC Board Layout

The best performances of the high voltage video amplifier will be obtained only with a carefully designed PC board. Output to input capacitance is 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.

Furthermore, capacitive coupling from the output of an amplifier toward the input of another one may induce excessive cross-talk.

Power Dissipation

The power dissipation consists of a static part and a dynamic part. The static dissipation is a function of $V_{OUT(DC)}$, V_{DD} and R_F . Reasonable approximation of the static power can be calculated by the following equation.

$$P_S = \frac{3V_{DD} (V_{DD} - V_{OUT})}{40k} + \frac{3V_{OUT} (V_{DD} - V_{OUT})}{R_F}$$

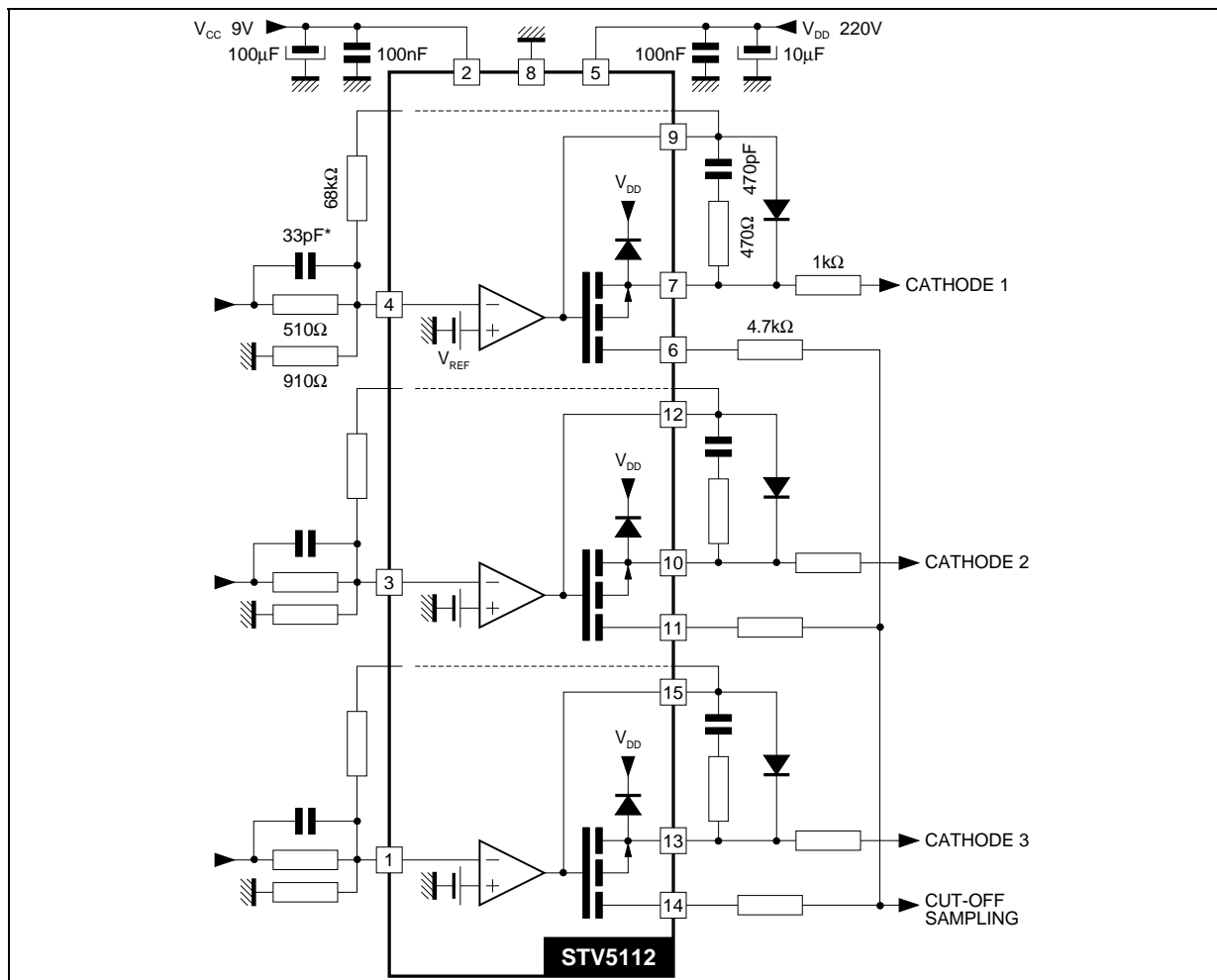
The dynamic dissipation depends on the signal spectrum, V_{OUT} , V_{DD} and the load capacitance.

- For a sine wave, dynamic dissipation is

$$P_d = 3 \times F \times C_L \times V_{OPP} \times 0.8 \times V_{DD}$$

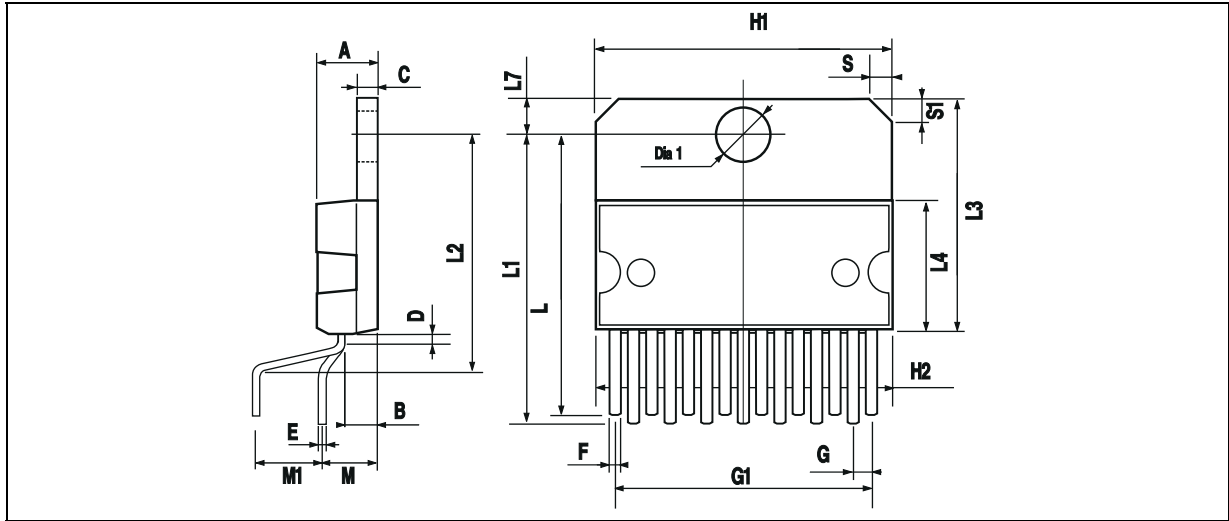
The load capacitance C_L includes CRT and board capacitance (10pF), and amplifier output capacitance (8pF) : total C_L value is about 20pF.

Figure 1 : Application Example



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PACKAGE MECHANICAL DATA : 15 PINS – PLASTIC MULTIWATT



PM4MM15V.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.66		0.75	0.026		0.030
G	1.14	1.27	1.4	0.045	0.050	0.055
G1	17.57	17.78	17.91	0.692	0.700	0.705
H1	19.6			0.772		
H2			20.2			0.795
L	22.1		22.6	0.870		0.890
L1	22		22.5	0.866		0.886
L2	17.65		18.1	0.695		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.20	4.30	4.60	0.170	0.169	0.181
M1	4.50	5.08	5.30	0.177	0.200	0.209
S	1.90		2.60	0.075		0.102
S1	1.90		2.60	0.075		0.102
Dia. 1	3.65		3.85	0.144		0.152

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