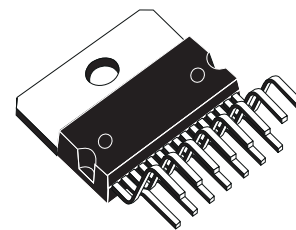# STV5111

RGB HIGH VOLTAGE VIDEO AMPLIFIER

■ Bandwidth : 6MHz typical

■ Supply Voltage : 200V typical

■ Rise and Fall Time : 60ns TYPICAL

■ CRT Cathode Current Outputs for Parallel or Sequential Cut-off or Drive Adjustment

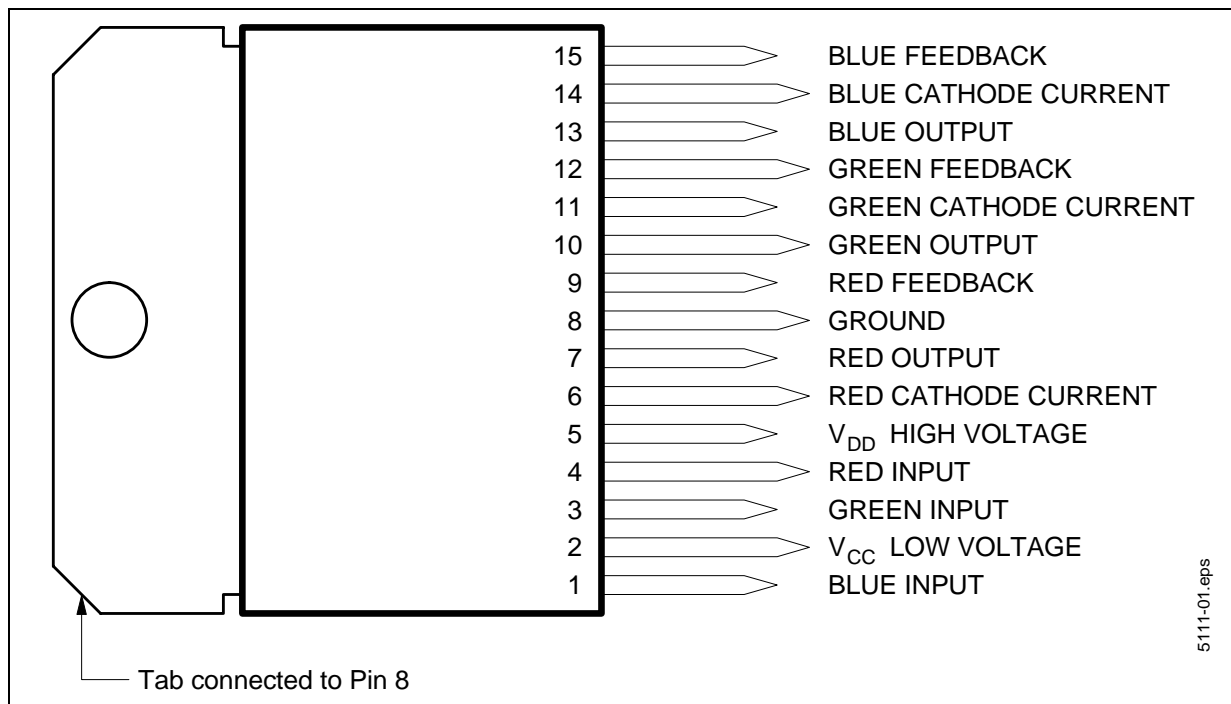■ Flashover Protection

DESCRIPTION

The STV5111 includes three video amplifiers desi-gned 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 STV5111 can be used with both par-allel and sequential sampling applications.

**MULTIWATT 15
(Plastic Package)**

**ORDER CODE: STV5111**

Figure 1. PIN CONNECTIONS

Pin	Signal
15	BLUE FEEDBACK
14	BLUE CATHODE CURRENT
13	BLUE OUTPUT
12	GREEN FEEDBACK
11	GREEN CATHODE CURRENT
10	GREEN OUTPUT
9	RED FEEDBACK
8	GROUND
7	RED OUTPUT
6	RED CATHODE CURRENT
5	V_{DD} HIGH VOLTAGE
4	RED INPUT
3	GREEN INPUT
2	V_{CC} LOW VOLTAGE
1	BLUE INPUT

Tab connected to Pin 8

5111-01.eps

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 200V.
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.

Figure 2. BLOCK DIAGRAM OF EACH CHANNEL
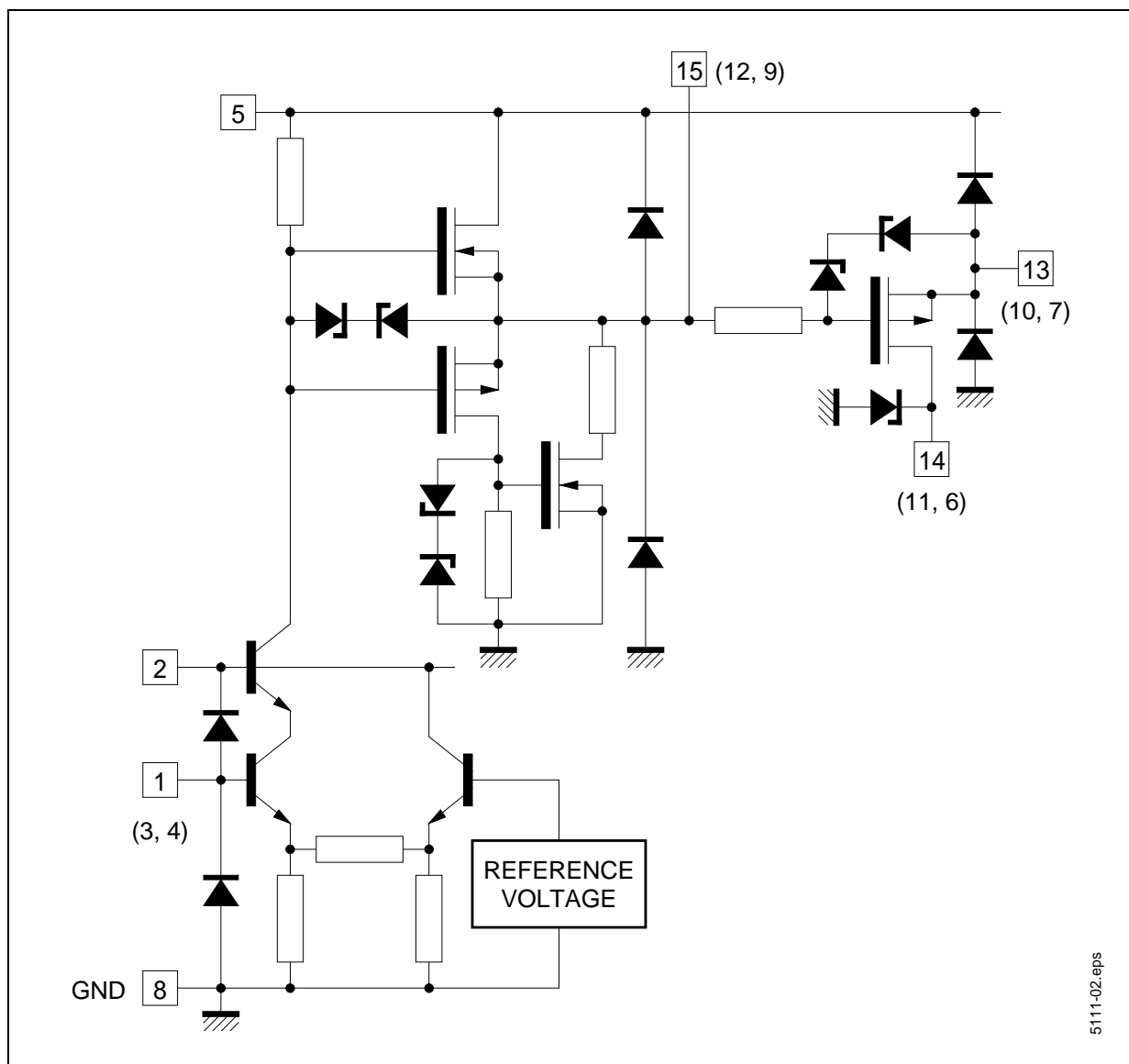
STV5111

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

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

ELECTRICAL CHARACTERISTICS (V_{CC} = 12V ; V_{DD} = 210V ; T_{amb} = 25°C ; AV = 55 unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{DD}	High Supply Voltage (Pin5)			200	210	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} = 100V		9.5	15	mA
I_{CC}	Low Voltage Supply Internal DC Current			38	55	mA
V_{sath}	Output Saturation Voltage (High level) (Pins7-10-13)	I_O = - 10µA		5		V
R_{ON}	Output Mos Transistor (Low level) (Pins7-10-13)			1.7		kΩ
BW	Bandwidth at - 3dB	Measured on CRT cathodes. (C_{LOAD} = 10pF, $R_{PROTECT}$ = 1kΩ V_{OUT} = 100V, D V_{OUT} = 100V_{PP})		6		MHz
t_R, t_F	Rise & Fall Time	Measured between 10% & 90% of output pulse (C_{LOAD} = 10pF, $R_{PROTECT}$ = 1kΩ V_{OUT} = 100V, D V_{OUT} = 100V_{PP}		60		ns
G_O	Open Loop Gain		47	50		dB
	Open Loop Gain Difference between 2channels		-1.5	0	1.5	dB
	Open Loop Gain Temperature Coefficient			0		dB/°C
P	Internal Power Dissipation (seecalculationbelow)	V_{OUT} = 2MHz, 70V_{PP} sine wave, V_{BLACK} = 170V, C_L = 20pF R_F = 68kΩ		3.6		dB/°C
V_{REF}	Internal Voltage Reference (Pins 1-3-4)	V_{OUT} = 100V	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} = 100V		75		µA
R_I	Input Resistance			4		kΩ
ESD	ESD Human Body Model		1.2			kV

TYPICAL APPLICATION

The STV5111 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 resis-tance, 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:

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

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.
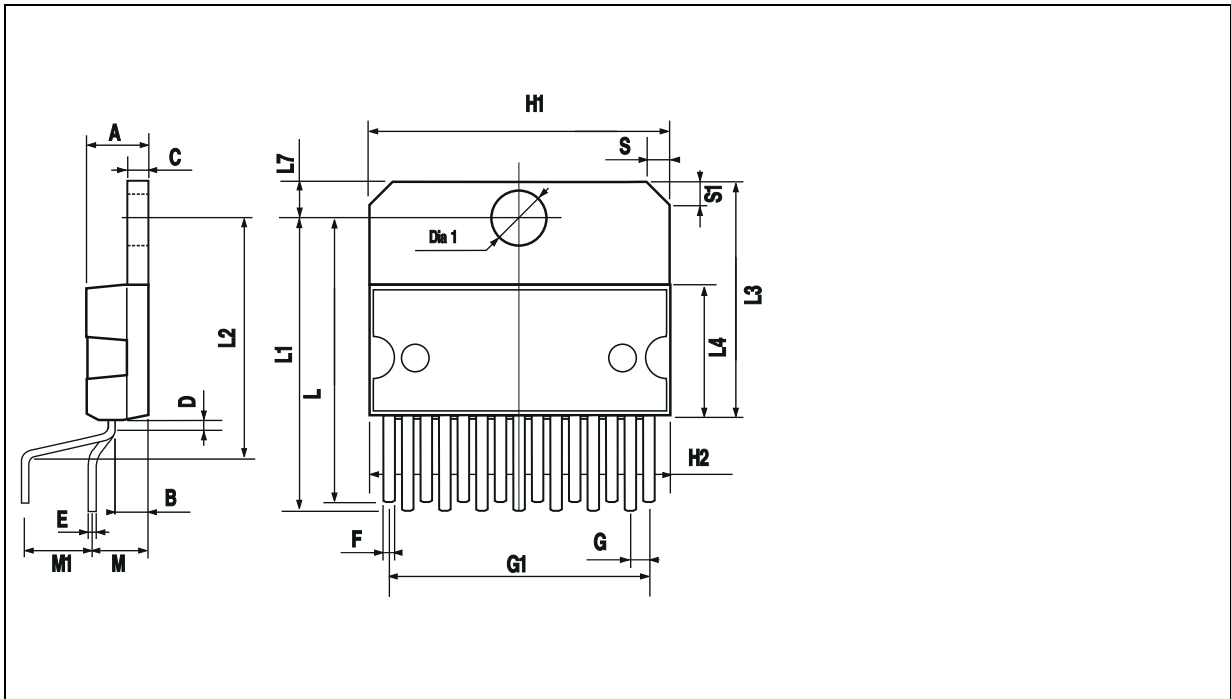
Figure 3. Application Example
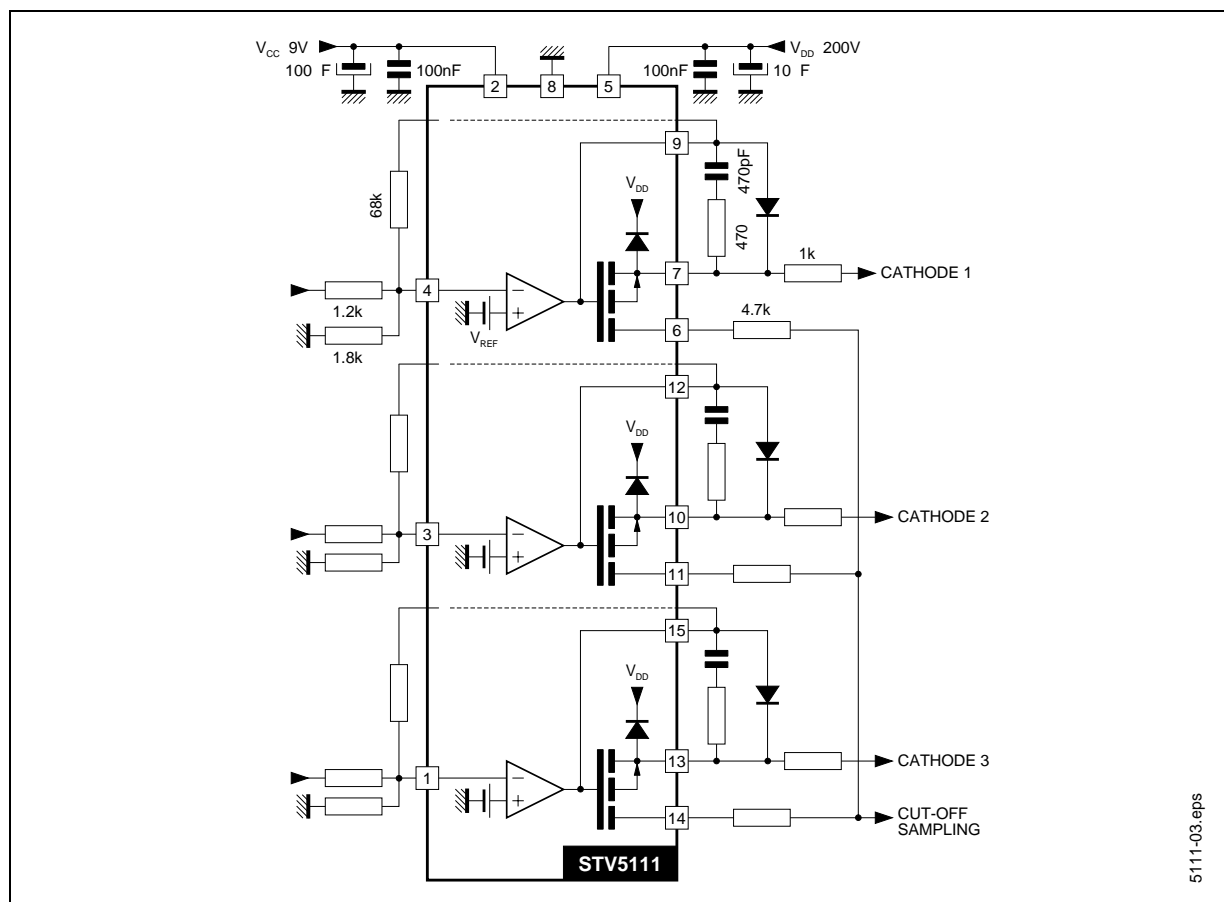
STV5111

PACKAGE MECHANICAL DATA

15 PINS - PLASTIC MULTIWATT

Figure 4. 15-Pin Package