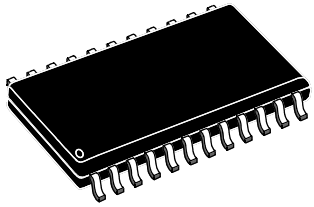
STV6434

Filtered video buffers for STB and DVD devices

Features

- Y, C, CVBS inputs with 7 MHz filters
- Y, Pr, Pb inputs with 14 MHz filters
- 6 dB gains
- Capabilities of integrated output buffers: single load (150Ω) for Y/Pr/Pb signals
  double load (75Ω) for Y, C and CVBS signals
- DC coupled outputs for CVBS and YPrPb signals, DC or AC coupled output for chroma signal
- Bottom clamp on Y and CVBS, bias clamp on C, sync clamps on Pr and Pb
- Crosstalk: 55 dB (typ.)
- Separate stand-by modes on Y/C/CVBS and on Y/Pr/Pb signals
- Switchable Y+C adder for decoders without CVBS outputs



SO24

Table 1. Device summary

Order code	Packaging
STV6434s	Tray

Description

The STV6434 is a filtered video output interface for STB and DVD applications.

After removing D/A conversion noises using integrated low pass filters, the STV6434 adapts in amplitude and impedance the video signals coming from the digital decoder for transmission via 75Ω adapted cables, to the TV set, VCR and auxiliary devices.

The STV6434 is powered by a 5V supply.

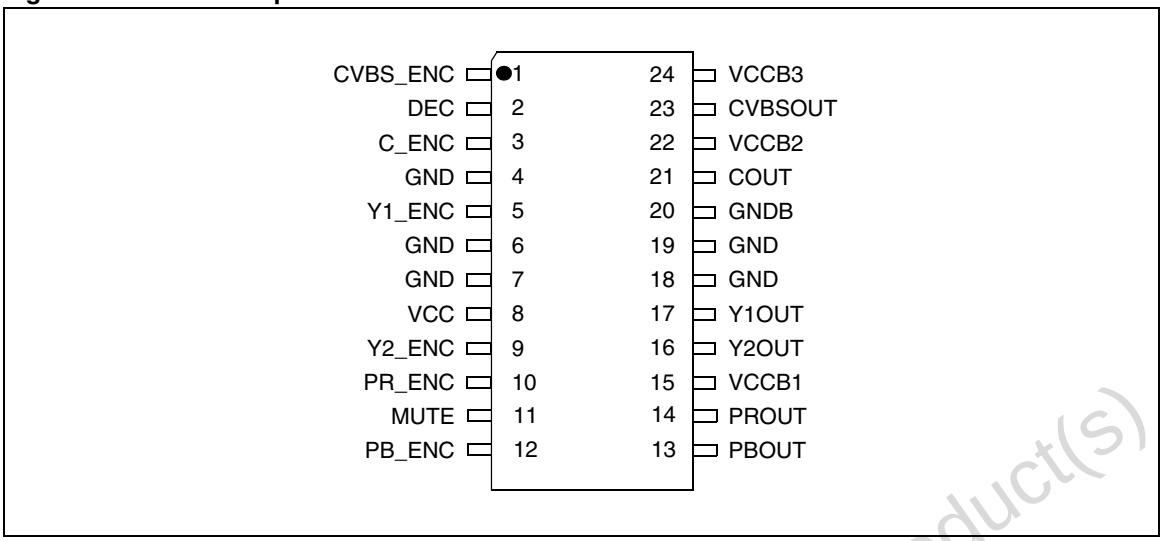
The STV6434 is fully compatible with STi55xx digital decoders.

The STV6434 is mounted in a SO24 package (STV6434S).

Contents

1 General information

Figure 1. STV6434S pinout



1.1 I/O pin description

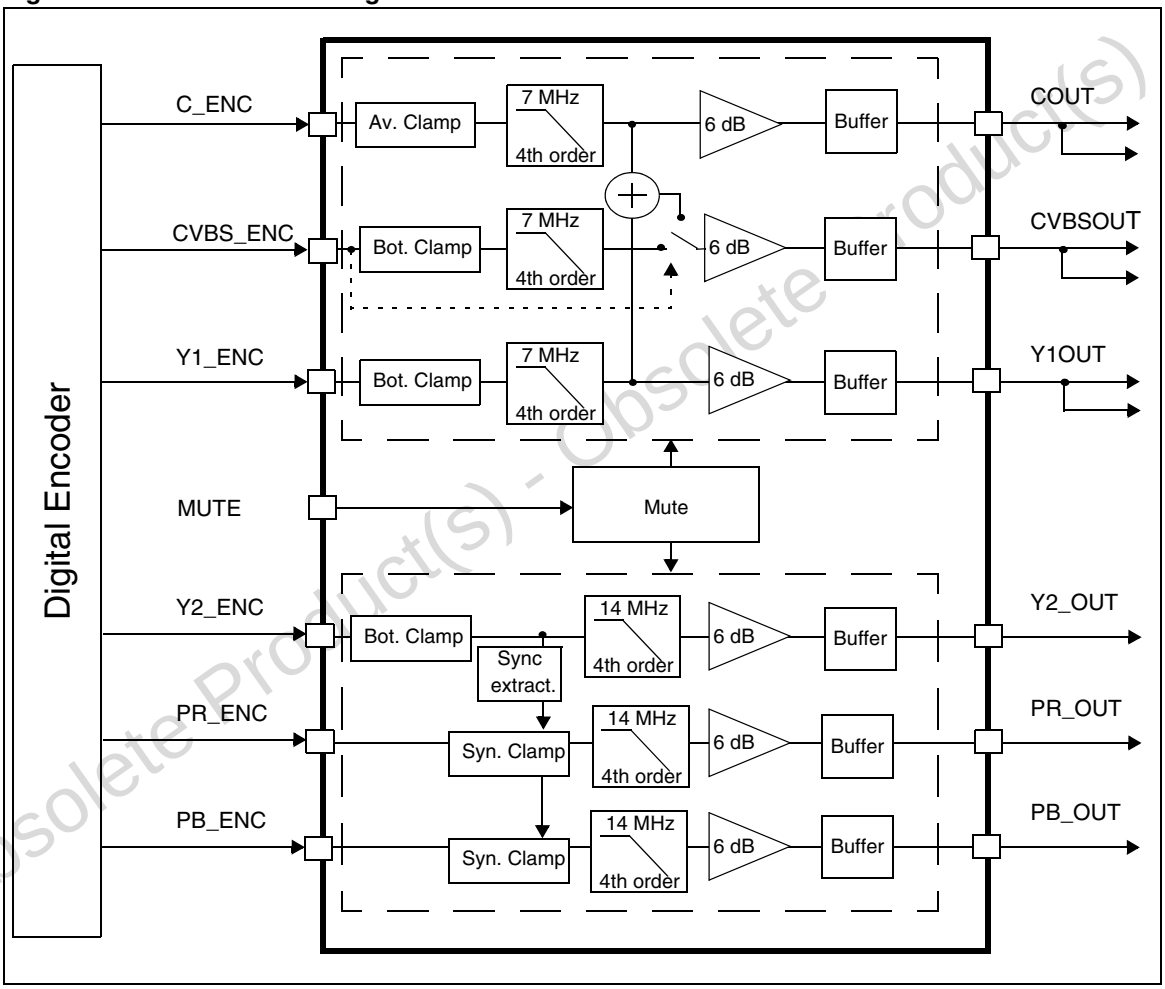
Table 2. I/O pin decription

STV6434S	Name	Function
1	CVBS_ENC	CVBS input from encoder or internal CVBS switch command
2	DEC	Decoupling capacitor
3	C_ENC	Chroma input from encoder
4	GND	Ground
5	Y1_ENC	Y Input from encoder
6	GND	Ground
7	GND	Ground
8	VCC	+5 V supply
9	Y2_ENC	Large-band Y input from encoder
10	PR_ENC	Large-band Pr input from encoder
11	MUTE	4-state command for mute
12	PB_ENC	Large-band Pb input from encoder
13	PBOUT	Pb output
14	PROUT	Pr output
15	VCCB1	+5 V supply for output buffers
16	Y2OUT	Y2 output

Table 2. I/O pin decription (continued)

STV6434S	Name	Function
17	Y1OUT	Y1 output
18	GND	Ground
19	GND	Ground
20	GNDB	Ground for buffers
21	COUT	Chroma output
22	VCCB2	+5 V supply for output buffers
23	CVBSOUT	CVBS output
24	VCCB3	+5 V supply for output buffers

Figure 2. STV6434 block diagram



2 Electrical characteristics

2.1 Absolute maximum ratings

Table 3. Absolute maximum ratings

Symbol	Parameter		Value	Unit
V_{CC}, V_{CCB}	Supply voltage		6	V
V	Voltage at all pins to ground		-0.6 to V_{CC}	V
V_{ESD}	ESD susceptibility	Human body model: 100 pF discharged through 1.5 kΩ serial resistor	±4	kV

2.2 Thermal data

Table 4. Thermal data

Symbol	Parameter	Value	Unit
R_{thJA}	Junction-to-ambient thermal resistance	70	°C/W
T_J	Maximum recommended junction temperature	130	°C
T_{OPER}	Operating ambient temperature	0 to +70	°C
T_{STG}	Storage temperature	-55 to +150	°C

2.3 Recommended operating conditions

Test conditions: T_{AMB} = 25°C, V_{CC} = 5 V; V_{CCB} = 5 V; $R_{GENERATOR}$ = 75 Ω, R_{LOUT} = 75 Ω for Y1OUT, CVBSOUT and COUT R_{LOUT} = 150 Ω for Y2OUT, PBOUT and PROUT, unless otherwise specified.

Table 5. Recommended operating conditions

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Supply voltages						
V_{CC}	Operating supply voltage		4.75	5.00	5.25	V
V_{CCB}	Buffer supply voltage		4.75	5.00	5.25	V
Active (channels ON)						
I_{CC1}	Supply current (V_{CC} + V_{CCB})	No load, MUTE pin to VCC pin (5 V) All channels active		50	65	mA
I_{CC2}	Supply current (V_{CC} + V_{CCB})	No load, MUTE pin = 1.5 V (not connected) Y1/C/CVBS active		30		mA
I_{CC3}	Supply current (V_{CC} + V_{CCB})	No load, MUTE pin = 3 V Y2/Pr/Pb active		30		mA

Table 5. Recommended operating conditions (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Standby (all channels OFF)						
I_{CCSTB}	Total supply current	No load, MUTE pin to 0 V		4		mA

2.3.1 Video section (Y1, Y2, and CVBS signals)

Test conditions: T_{AMB} = 25°C, V_{CC} = 5 V; V_{CCB} = 5 V; $R_{GENERATOR}$ = 75 Ω, R_{LOUT} = 75 Ω for Y1 and CVBS outputs and R_{LOUT} = 150 Ω for Y2 output, unless otherwise specified.

Table 6. Video section (Y1, Y2 and CVBS signals)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{DCIN}	DC input level, bottom clamp input	Bottom level, Y1 and CVBS inputs		2		V
I_{CLAMP}	Clamping current, bottom clamp input	at V_{DCIN} - 400 mV	0.2	1	1.5	mA
I_{LEAK}	Input leakage current, bottom clamp input	$V_{IN} = V_{DCIN}$ +1 V		1	10	µA
V_{DCIN_YSYNC}	DC input level	Y2 input, YPrPb mode, black level		2.3		V
C_{IN}	Input capacitance			2		pF
V_{IN}	Maximum input signal	V_{CCV} = 5 V		1.4		V_{PP}
DYN	Dynamic output signal	V_{CCV} = 5 V		2.8		V_{PP}
Y1F1	-1 dB bandwidth (flatness) of Y1 and CVBS	1H signal	4.0	4.5		MHz
Y2F1	-1 dB bandwidth (flatness) of Y2	2H signal	8	9		MHz
Y1F3	-3 dB bandwidth of Y1 and CVBS	1H signal		7		MHz
Y2F3	-3 dB bandwidth of Y2	2H signal		14		MHz
Y1SBR	Stopband rejection	27 MHz versus 100 kHz		- 40		dB
Y2SBR	Stopband rejection	54 MHz versus 100 kHz		- 40		dB
Flatness	Spread of gain in video bands	V_{IN} = 1 V_{PP} Band = 15 kHz to 5 MHz for Y1 and CVBS Band = 15 kHz to 10 MHz for Y2			±0.5	dB
VCTo	Crosstalk isolation of Y1 (or Y2 or CVBS) from C and Pr Pb channels	V_{IN} = 0.5 V_{PP} at f = 3.58 MHz, on either CIN_ENC or PRIN_ENC or PBIN_ENC input, R_{LOAD} = 150Ω		55		dB
R_{OUT}	Output resistance			5	10	Ω
GY	Gain on Y1, Y2 and CVBS channels	V_{IN} = 1 V_{PP} at f = 1 MHz	5.5	6	6.5	dB

Table 6. Video section (Y1, Y2 and CVBS signals) (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
DC_{YOUT}	DC output voltage (Y1 and Y2)	Video signal bottom sync pulse at IC output pins		0.5		V
$DC_{CVBSOUT}$	DC output voltage (CVBS)	Video signal bottom sync pulse at IC output pin		1.0		V
DPHI	Differential phase	V_{IN} = 1 V_{PP} at f = 3.58 MHz		0.2	3	deg.
DG	Differential gain	V_{IN} = 1 V_{PP} at f = 3.58 MHz		0.3	3	%
LNL	Luminance non-linearity			0.5	3	%
VSN7	Video S/N ratio: Y1, C and CVBS channels (7 MHz filter)	NTC-7 weighting 4.2 MHz lowpass		70		dB
VSN14	Video S/N ratio: Y2, Pr and Pb channels (14 MHz filter)	NTC-7 weighting 4.2 MHz lowpass		67		dB
Dtpd7	Group delay variation from flatness	7 MHz filter		20		nS
Dtpd14	Group delay variation from flatness	14 MHz filter		10		nS

2.3.2 Chroma section

Test conditions: T_{AMB} = 25°C, V_{CC} = 5 V; V_{CCB} = 5 V; $R_{GENERATOR}$ = 75 Ω and R_{LOUT} = 75 Ω unless otherwise specified.

Table 7. Chroma section

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{DCIN}	DC input level			3		V
R_{IN}	Input resistance		30	50		kΩ
C_{IN}	Input capacitance			2		pF
V_{IN}	Max input signal				1	V_{PP}
DYN	Dynamic output signal				2	V_{PP}
DC_{COUT}	DC output voltage (COUT)	Without signal		1.5		V
CF1	-1 dB bandwidth (flatness)		4	4.5		MHz
CF3	-3 dB bandwidth			7		MHz
CSBR	Stopband rejection	27 MHz versus 100 kHz		- 40		dB
Flatness	Spread of gain in video bands	V_{IN} = 1 V_{PP} Band = 15 kHz to 5 MHz for Y1 and CVBS			±0.5	dB
CCTo	Crosstalk isolation of C from Y1, Y2 and CVBS channels	V_{IN} = 1 V_{PP} at f = 3.58 MHz, on Y1 or Y2 or CVBS inputs, R_{LOAD} = 150Ω		55		dB
R_{OUT}	Output resistance			5	10	Ω
GC	Gain on C channel	V_{IN} = 1 V_{PP} at f = 1 MHz	5.5	6	6.5	dB

Table 7. Chroma section (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
CToYdel	Chroma to luma delay, source Y1/C	V_{IN} = 1 V_{PP} at f = 3.58 MHz			20	ns
YCadd	Voltage to be applied at CVBS_ENC input for Y+C adder selection			V_{CC}	V_{CC}	V

2.3.3 Pb/Pr section

Test conditions: T_{AMB} = 25°C, V_{CC} = 5 V; V_{CCB} = 5 V; $R_{GENERATOR}$ = 75 Ω and R_{LOUT} = 150 Ω, unless otherwise specified

Table 8. Pb/Pr section

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{DCIN_SYNC}	DC input level	Sync clamp input (Pr,Pb) Sync signal on Y input		3.0		V
I_{CLAMP_SYNC}	Clamping current, sync clamp	Sync clamp input (Pr,Pb) at V_{DCIN} -400 mV		100		µA
C_{IN}	Input capacitance			2		pF
V_{IN}	Max input signal				1	V_{PP}
DYN	Dynamic output signal				2	V_{PP}
$DC_{PrPbOUT}$	DC output voltage (Pr and Pb outputs)	Black level sync signal on Y2 input		1.5		V
PF1	-1 dB bandwidth (flatness)		8	9		MHz
PF3	-3 dB bandwidth			14		MHz
PSBR	Stopband rejection	27 MHz versus 100 kHz		- 40		dB
Flatness	Spread of gain in video bands	V_{IN} = 1 V_{PP} Band = 15 kHz to 10 MHz			±0.5	dB
PCTo	Crosstalk isolation of Pr or Pb from Y1, Y2 and CVBS channels	V_{IN} = 1 V_{PP} at f = 3.58 MHz, on Y1 or Y2 or CVBS input, R_{LOAD} = 150Ω		55		dB
R_{OUT}	Output resistance			5	10	Ω
GP	Gain on Pr and Pb channels	V_{IN} = 1 V_{PP} at f = 1 MHz	5.5	6	6.5	dB

2.3.4 Mute section

Test conditions: T_{AMB} = 25°C, V_{CC} = 5 V; V_{CCB} = 5 V; $R_{GENERATOR}$ = 75 Ω and R_{LOUT} = 75 Ω unless otherwise specified.

Table 9. Mute section

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{00}	MUTE voltage for Y1/C/CVBS muted and Y2/Pr/Pb muted	Pin MUTE to GND or logical 0	0		1.1	V
V_{01}	MUTE voltage for Y1/C/CVBS active and Y2/Pr/Pb muted	Pin MUTE opened (not connected) See *Note 1*.	1.3		1.7	V
V_{10}	MUTE voltage for Y1/C/CVBS muted and Y2/Pr/Pb active	Pin MUTE connected by 22 kΩ to VCC or at 3.3V (I_{IN} < 140 µA)	1.9		4	V
V_{11}	MUTE voltage for Y1/C/CVBS active and Y2/Pr/Pb active	Pin MUTE to VCC (5V)	4.2		Vcc	V

Note: 1 When the MUTE pin is left open, its voltage is defined by an internal voltage divider performed by a 42 kΩ resistor to Vcc and 18 kΩ resistor to GND.

3 Input/output groups

Figure 3. Bottom clamped video input (Y1_ENC)

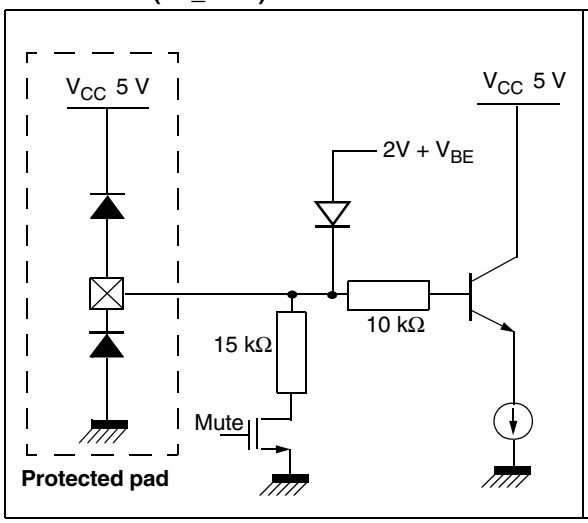


Figure 4. Video outputs (CVBSOUT, Y1OUT, Y2OUT, PROUT and PBOUT)

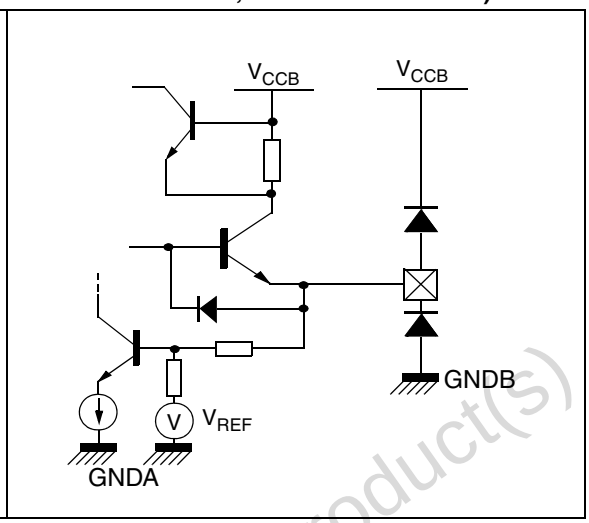


Figure 5. Average clamped video input (C_ENC)

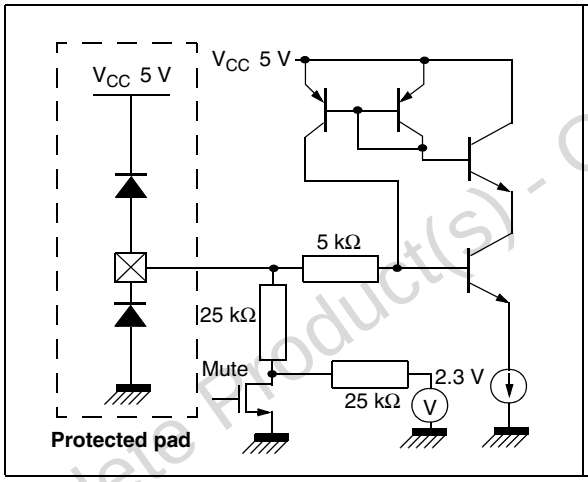


Figure 6. C video output (COUT)

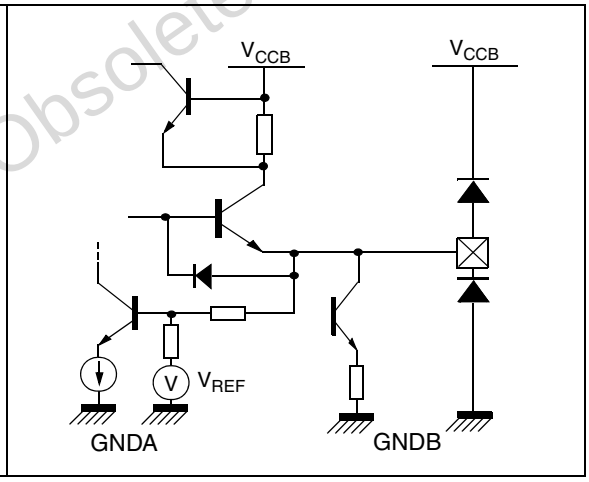


Figure 7. Black level clamped video input (Y2_ENC)

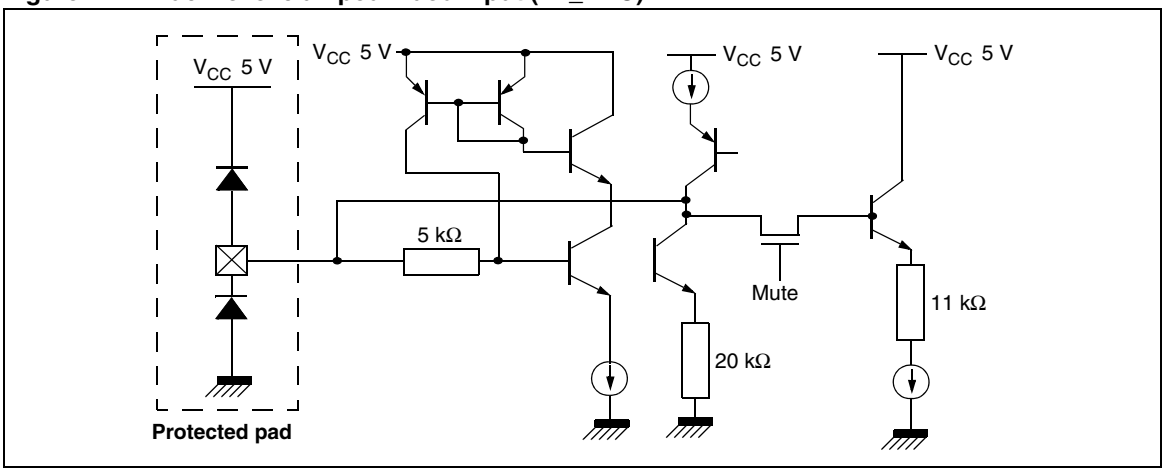


Figure 8. Pb/Pr inputs (PR_ENC and PB_ENC)

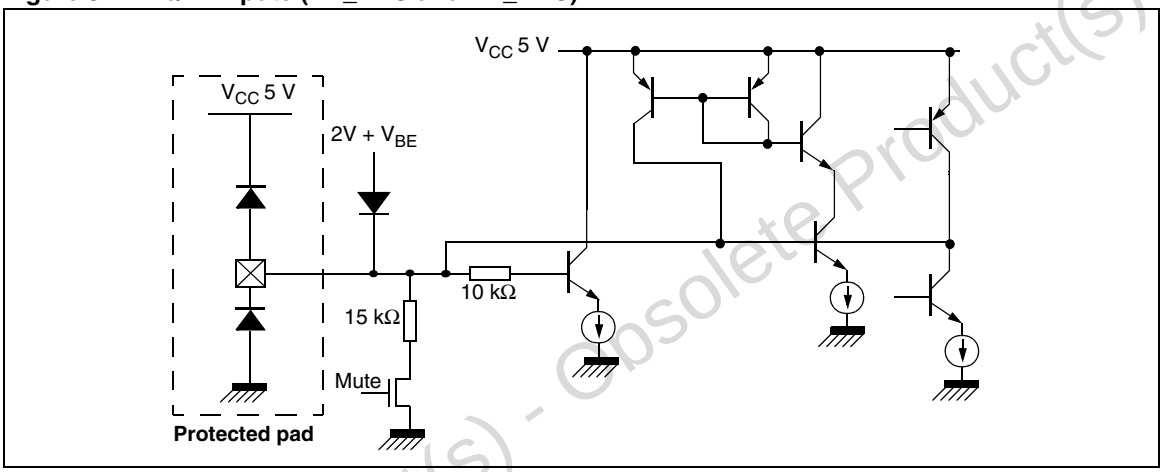


Figure 9. Decoupling capacitor (DEC)

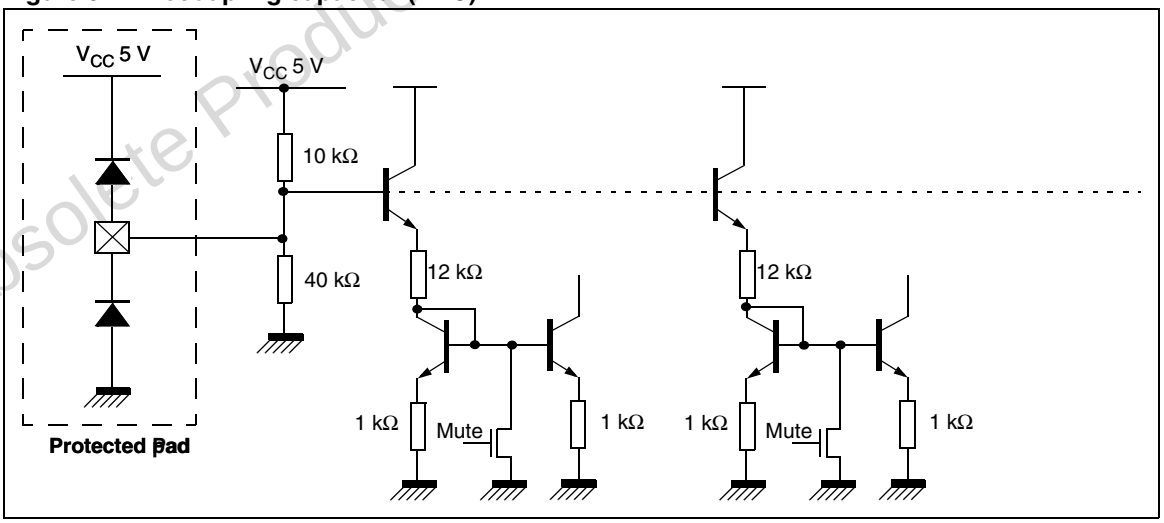


Figure 10. Mute (MUTE)

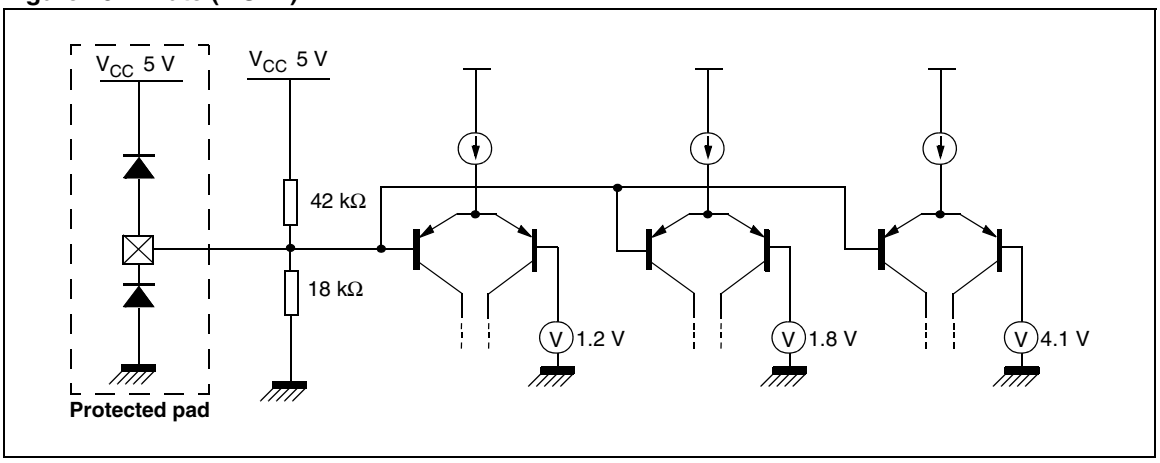


Figure 11. CVBS input (CVBS_ENC)

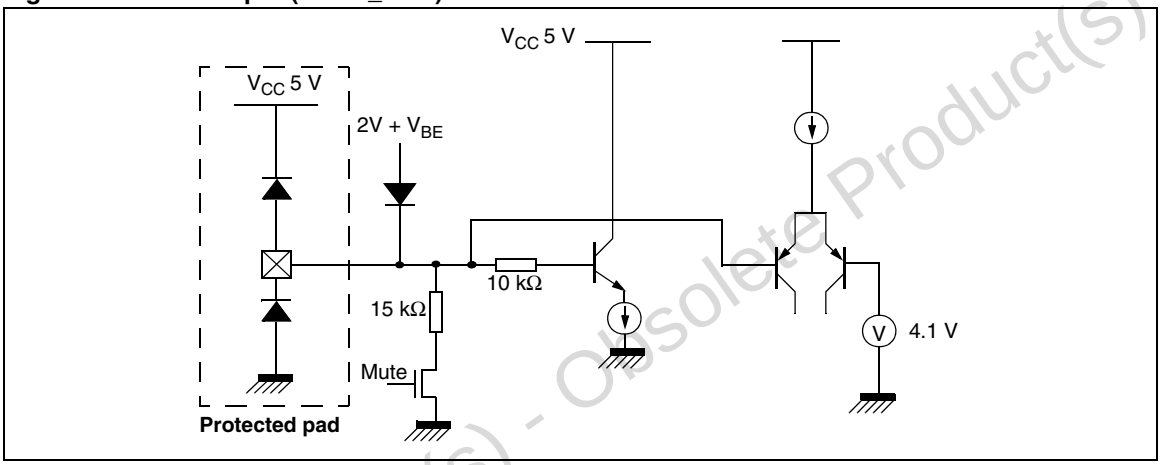
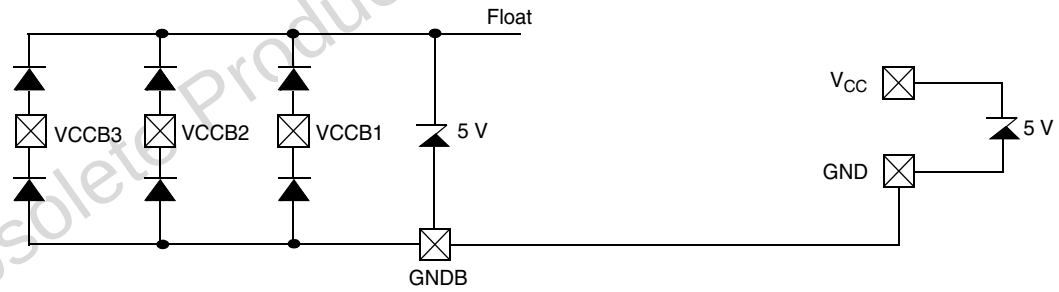
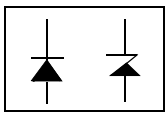


Figure 12. Power supply connection





These symbols represent large diode and Zener-like components used for ESD protection of the device. They are not supposed to be paths for any current in normal operation mode.

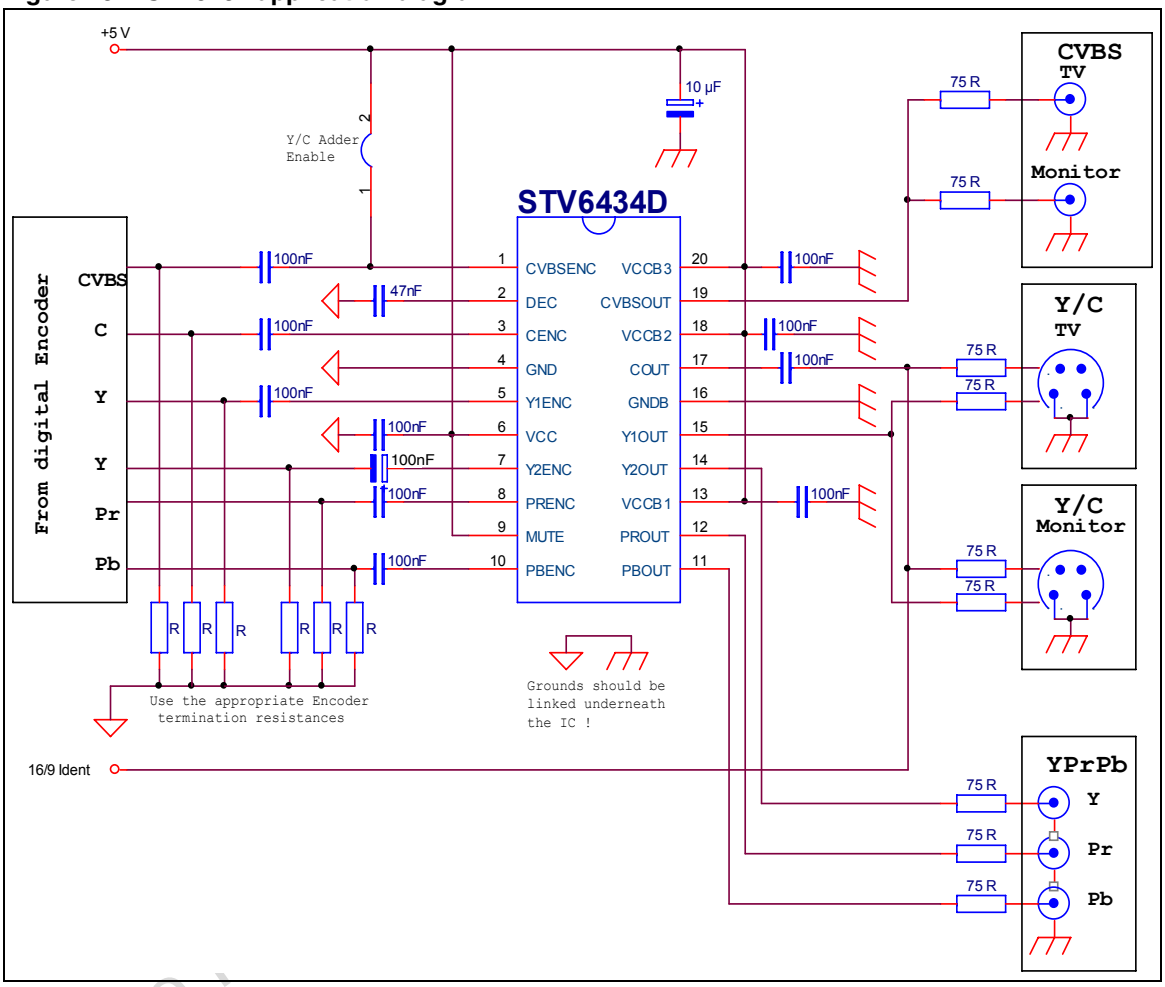
Table 10. Power supply

Supply	Description
VCCB1	Y2OUT, PROUT and PBOUT supply
VCCB2	Y1OUT and COUT supply
VCCB3	CVBSOUT supply
GNDB	Output buffer ground
VCC	Input stages, filters and 6-dB amplifier supply
GND	Input stages, filters and 6-dB amplifier ground

4 Application diagram

Note: The application diagram presented here is an example only and is subject to change without notice. The real application diagram will depend on application conditions and constraints.

Figure 13. STV6434 application diagram



5 Package mechanical data

Figure 14. 24-pin plastic small outline package (SO24)

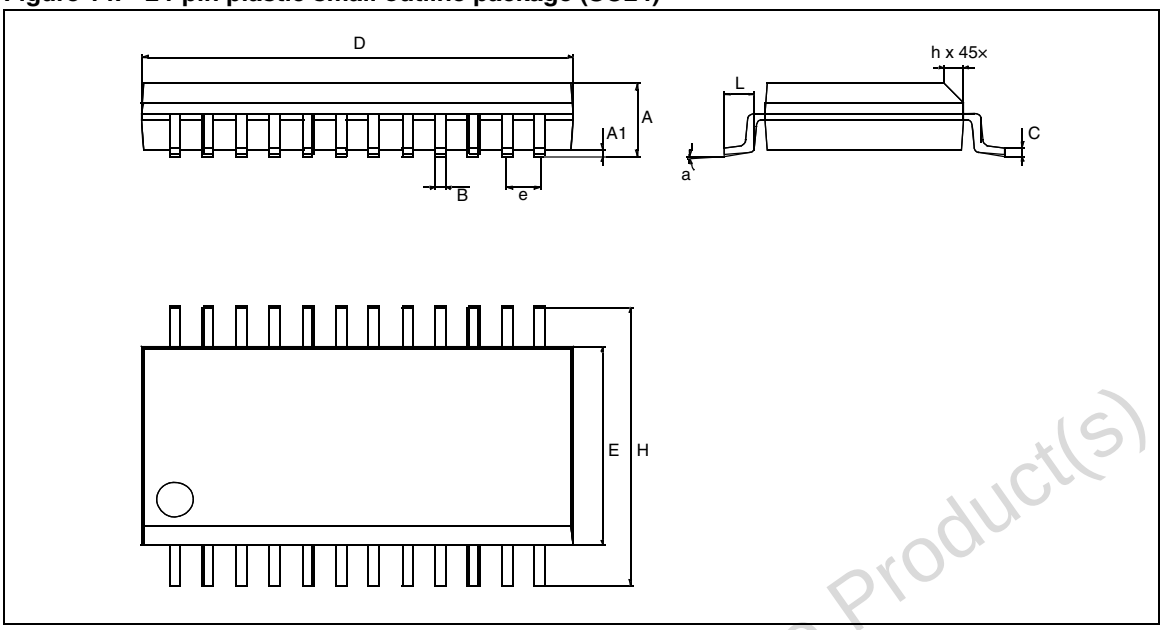


Table 11. 24-pin plastic small outline package dimensions

Dim.	mm			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.35		2.65	0.093		0.104
A1	0.10		0.30	0.004		0.012
B	0.33		0.51	0.013		0.020
C	0.23		0.32	0.009		0.013
D	15.20		15.60	0.599		0.614
E	7.40		7.60	0.291		0.299
e		1.27			0.050	
H	10.00		10.65	0.394		0.419
h	0.25		0.75	0.010		0.030
α	0°		8°	0°		8°
L	0.40		1.27	0.016		0.050

5.1 Environmentally-friendly packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance.

ECOPACK specifications, grade definitions and product status are available at: *www.st.com.* ECOPACK is an ST trademark.

6 Revision history

Table 12. Document revision history

Date	Revision	Changes
28-May-2002	0.1	First issue.
14-Jun-2002	0.2	Addition of *Figure 13*, Modification of *Figure 2: STV6434 block diagram*, RGB bottom clamp, RGB parameters in *Chapter 2: Electrical characteristics* and diagrams *Chapter 3: Input/output groups*.
21-Jun-2002	1.0	Modification of *Figure 2.: STV6434 block diagram* and active channel and mute values in *Section 2.3: Recommended operating conditions*.
24-May-2005	1.1	Removed DIP20 package information.
26-Mar-2007	2	Reformatted to new corporate template. Addition of disclaimer for *Figure 13.: STV6434 application diagram*.
01-Apr-2009	3	Preliminary banner removed, *Section 5.1: Environmentally-friendly packages* added

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