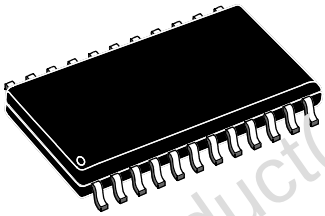
STV6435

Filtered video buffers for STB and DVD devices

Features

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



SO24

Table 1. Device summary

Order code	Packaging
STV6435S	Tray

Description

The STV6435 is a filtered video output interface for STB and DVD applications.

After removing D/A conversion noises using integrated low pass filters, the STV6435 adapts in amplitude and impedance the video signals coming from the digital decoder for transmission, via 75 Ω adapted cables, to the TV set, VCR and auxiliary devices.

The STV6435 is powered by a 5V supply.

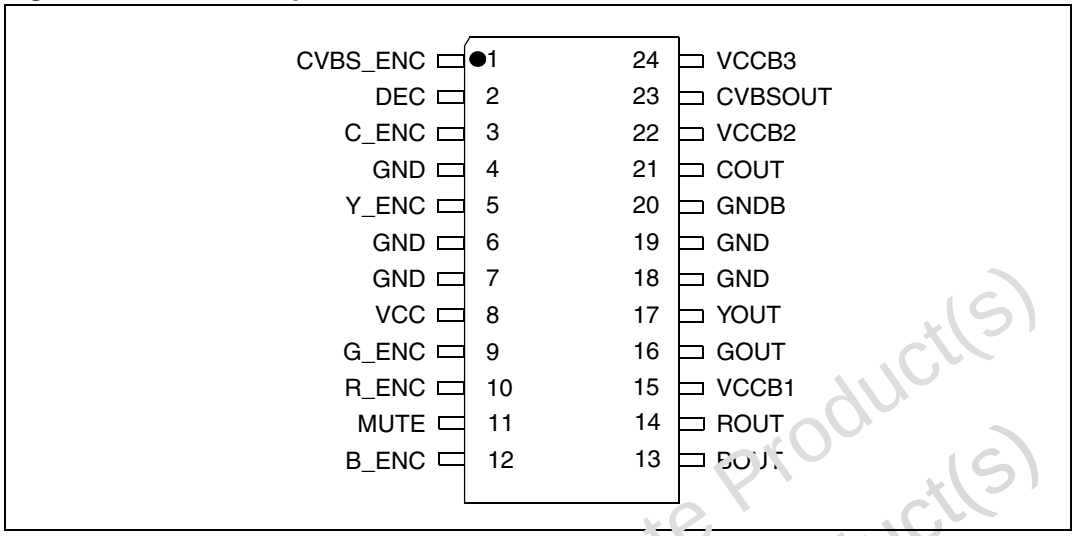
The STV6435 is fully compatible with STi55xx digital decoders.

The STV6435 is mounted in a SO24 package (STV6435S).

Contents

1 General Information

Figure 1. STV6435S pinout



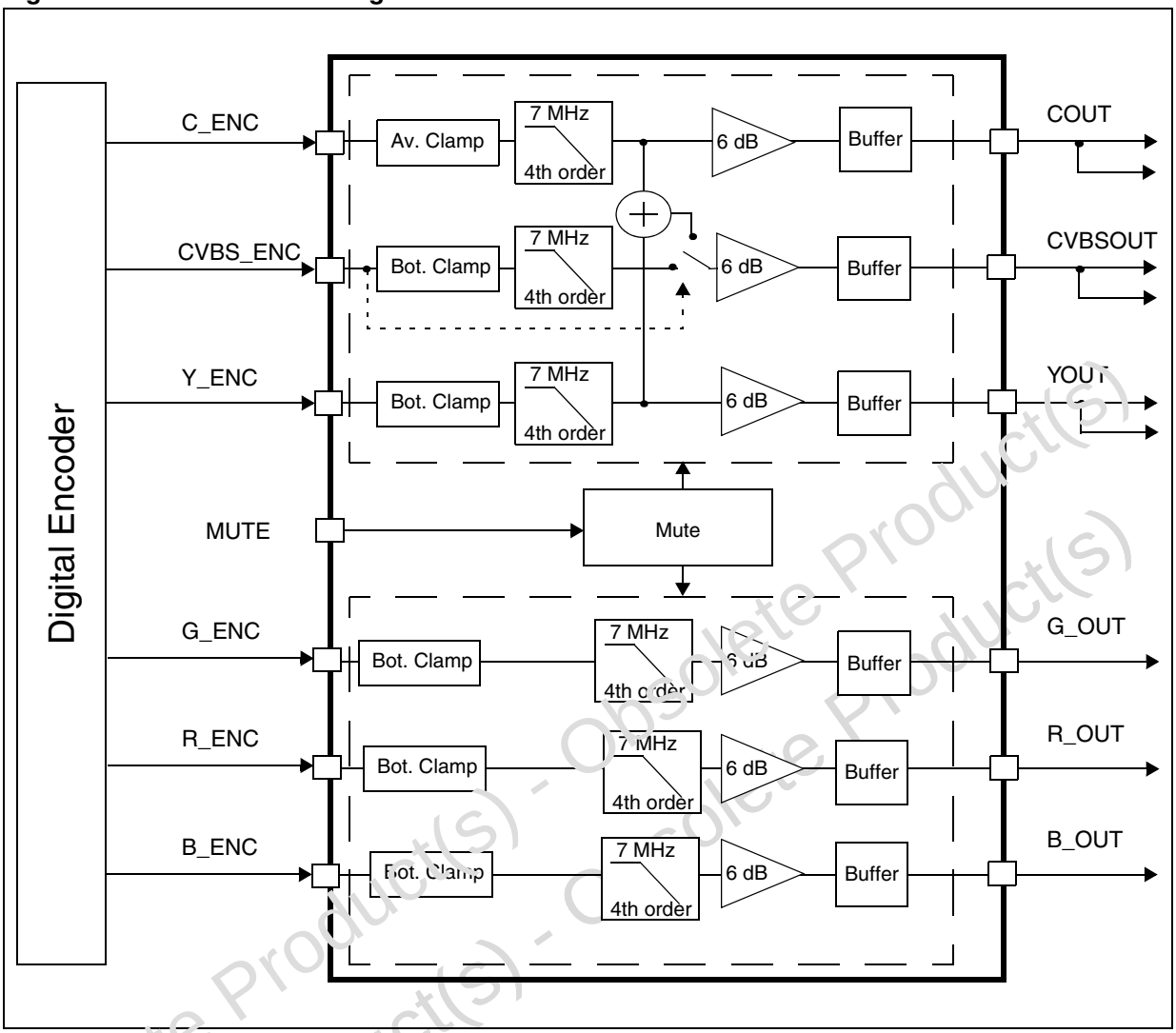
Note: The three RGB channels are identical and their pin assignments may be interchanged in an application if needed. In this case, verify that the outputs correspond to the inputs; for example, the pin 9 input must correspond to the pin 16 output.

1.1 I/O pin description

Table 2. Pin description

STV6435S	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	Y_ENC	Y input from encoder
6	GND	Ground
7	GND	Ground
8	VCC	+5 V supply
9	G_ENC	Large-band Y Input from encoder
10	R_ENC	Large-band R Input from encoder
11	MUTE	4-State command for mute
12	B_ENC	Large-band B Input from encoder
13	BOUT	B Output
14	ROUT	R Output
15	VCCB1	+5 V supply for output buffers
16	GOUT	G Output
17	YOUT	Y 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. STV6435 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 YOUT, CVBSOUT and COUT R_{LOUT} = 150 Ω for GOUT, BOUT and ROUT, 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) Y/C/CVBS active		30		mA
I_{CC3}	Supply current (V_{CC} + V_{CCB})	No load, MUTE pin = 3 V RGB 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	Noload, MUTE pin to 0 V		4		mA

2.3.1 Video section (Y 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 Y and CVBS outputs and R_{LOUT} = 150 Ω for G output, unless otherwise specified.

Table 6. Video section (Y and CVBS signals)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{DCIN}	DC input level, bottom clamp input	Bottom level, Y and CVBS inputs		2		V
I_{CLAMP}	Clamping current, bottom clamp input	at V_{DCIN} - 400 mV	1	2		mA
I_{LEAK}	Input leakage current, bottom clamp input	$V_{IN} = V_{DCIN}$ +1 V		1	10	µA
C_{IN}	Input capacitance			2		pF
V_{IN}	Maximum Input signal	V_{CCV} = 5 V			1.5	V_{PP}
DYN	Dynamic output signal	V_{CCV} = 5 V			3	V_{PP}
YF1	-1 dB bandwidth (flatness) of Y and CVBS	1H signal	4.0	4.5		MHz
YF3	-3 dB bandwidth of Y and CVBS	1H signal		7		MHz
YSBR	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 Y and CVBS			±0.5	dB
VCTo	Crosstalk Isolation of Y (or CVBS) from C and RGB channels	V_{IN} = 0.5 V_{PP} at f = 3.58 MHz, on either CIN_ENC, RIN_ENC, BIN_ENC or GIN_ENC inputs, R_{LOAD} = 150Ω		55		dB
R_{OUT}	Output resistance			5	10	W
GY	Gain on Y and CVBS channels	V_{IN} = 1 V_{PP} at f = 1 MHz	5.5	6	6.5	dB
DC_{YOUT}	DC output voltage (Y)	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	%

Table 6. Video section (Y and CVBS signals) (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
VSN7	Video S/N ratio: Y, C, CVBS and RGB channels (7 MHz filter)	NTC-7 weighting 4.2 MHz lowpass		70		dB
Dtpd7	Group delay variation from flatness	7 MHz filter		20		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 Y and CVBS			±0.5	dB
CCTo	Crosstalk isolation of C from Y, RGB and CVBS channels	V_{IN} = 1 V_{PP} at f = 3.58 MHz, on Y or CVBS inputs, R_{LOAD} = 150Ω		55		dB
R_{OUT}	Output resistance			5	10	W
GC	Gain on C channel	V_{IN} = 1 V_{PP} at f = 1 MHz	5.5	6	6.5	dB
CroYdel	Chroma to luma delay, source Y/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 RGB 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. RGB section

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{DCIN}	DC input level, bottom clamp input			2.0		V
I_{CLAMP}	Clamping current, bottom clamp input	at V_{DCIN} -400 mV	1	2		mA
I_{LEAK}	Input leakage current, bottom clamp input	$V_{IN} = V_{DCIN}$ +1 V		1	10	µA
C_{IN}	Input capacitance			2		pF
V_{IN}	Max input signal				1.5	V_{PP}
DYN	Dynamic output signal				3	V_{PP}
DC_{RGBOUT}	DC output voltage	Video signal bottom sync at IC output pin		0.5		V
PF1	-1 dB bandwidth (flatness)		4	4.5		MHz
PF3	-3 dB bandwidth			7.0		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 5 MHz			±0.5	dB
PCTo	Crosstalk isolation of RGB from Y, C and CVBS channels	V_{IN} = 1 V_{PP} at f = 3.58 MHz, on Y, C or CVBS input, R_{LOAD} = 150Ω		55		dB
R_{OUT}	Output resistance			5	10	W
GP	Gain of RGB 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 Y/C/CVBS muted and RGB muted	Pin MUTE to GND or logical 0	0		1.1	V
V_{01}	MUTE voltage for Y/C/CVBS active and RGB muted	Pin MUTE opened (not connected)(1)	1.3		1.7	V
V_{10}	MUTE voltage for Y/C/CVBS muted and RGB 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 Y/C/CVBS active and RGB active	Pin MUTE to VCC (5V)	4.2		Vcc	V

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 (Y_ENC, R_ENC, G_ENC and B_ENC)

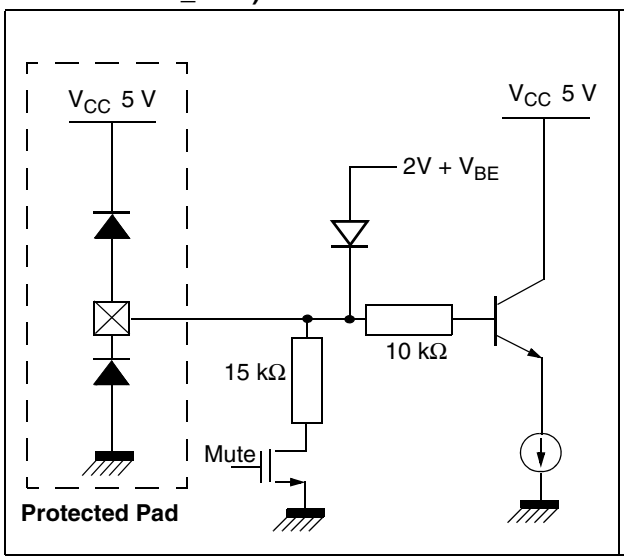


Figure 4. Average clamped video input (C_ENC)

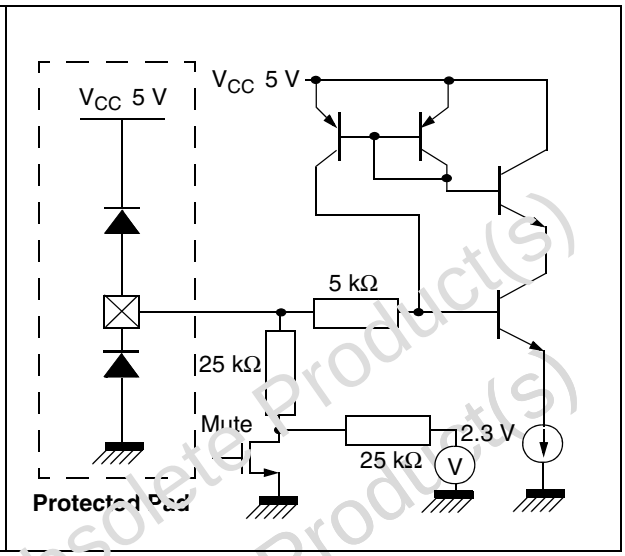


Figure 5. Video outputs (CVBSOUT, YOUT, GOUT, ROUT and BOUT)

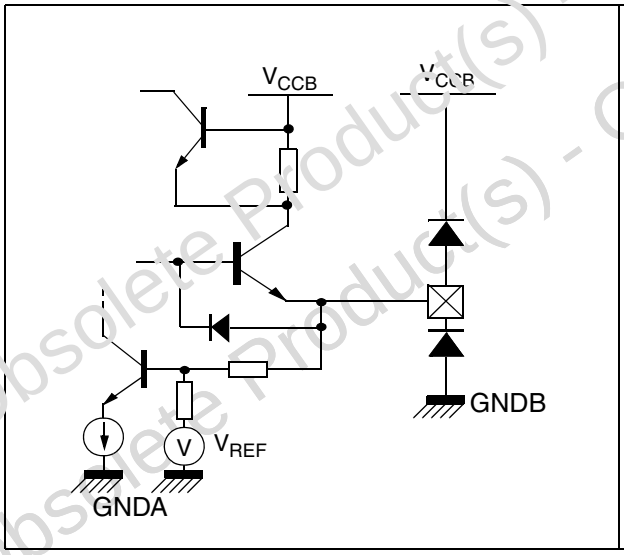


Figure 6. C video output (COUT)

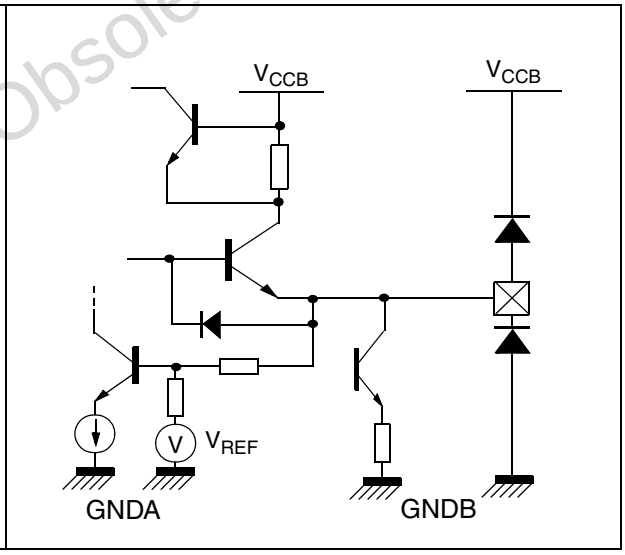


Figure 7. Decoupling capacitor (DEC)

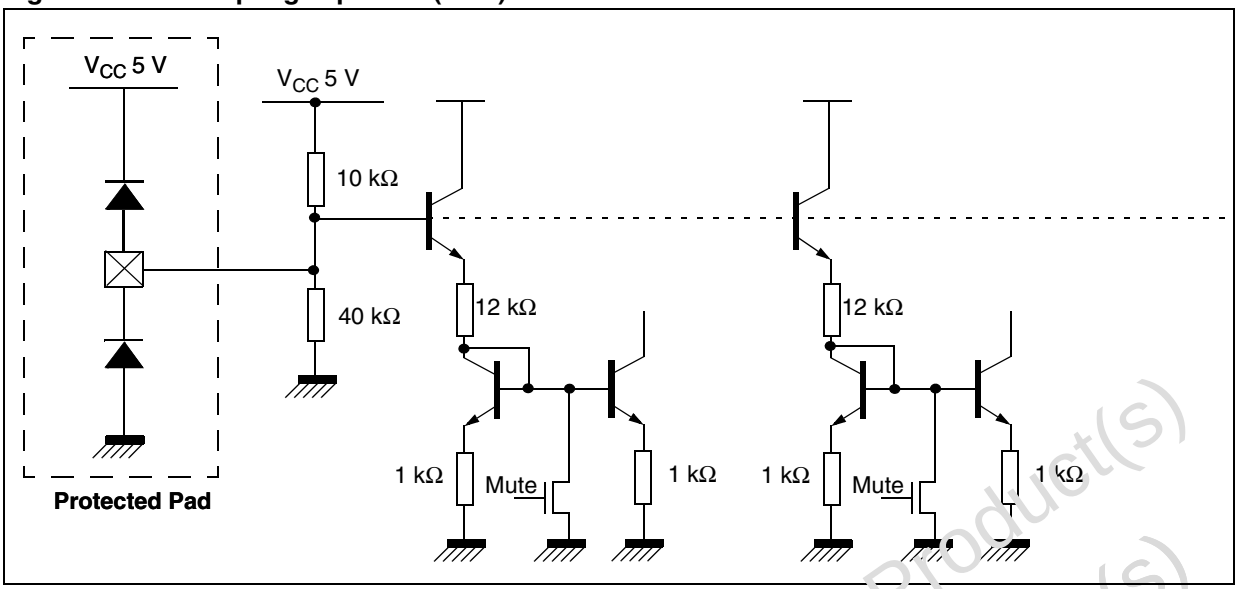


Figure 8. Mute (MUTE)

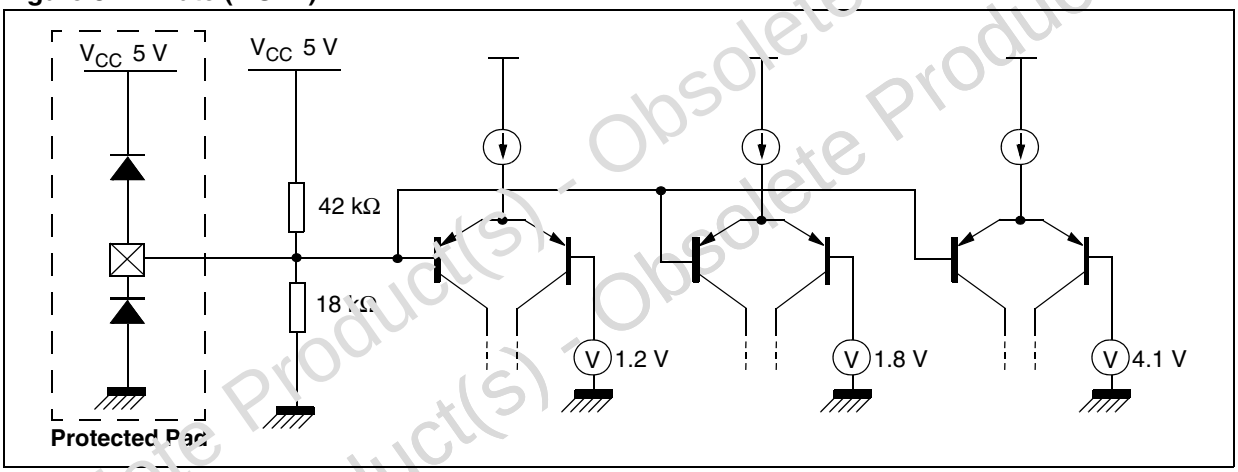


Figure 9. CVBS input (CVBS_ENC)

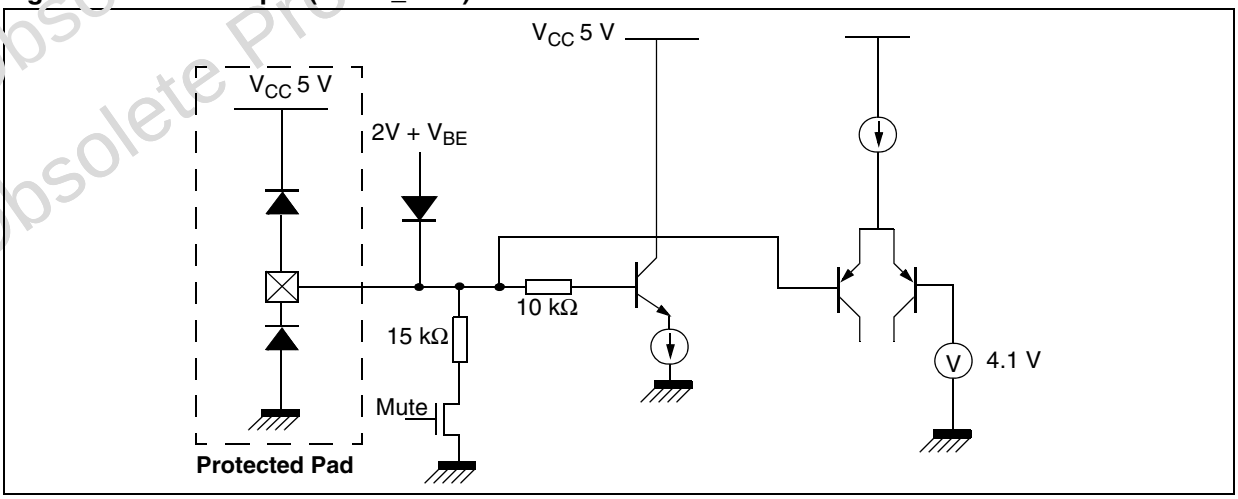
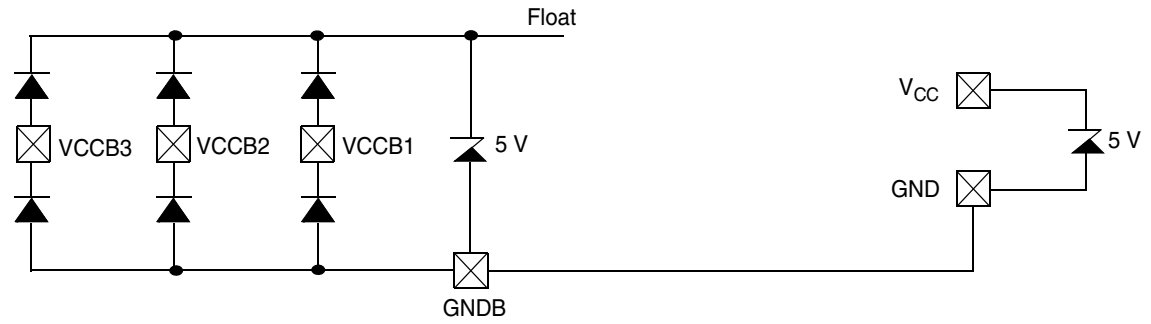
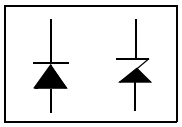


Figure 10. Power supply connection





These symbols represent some huge 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.

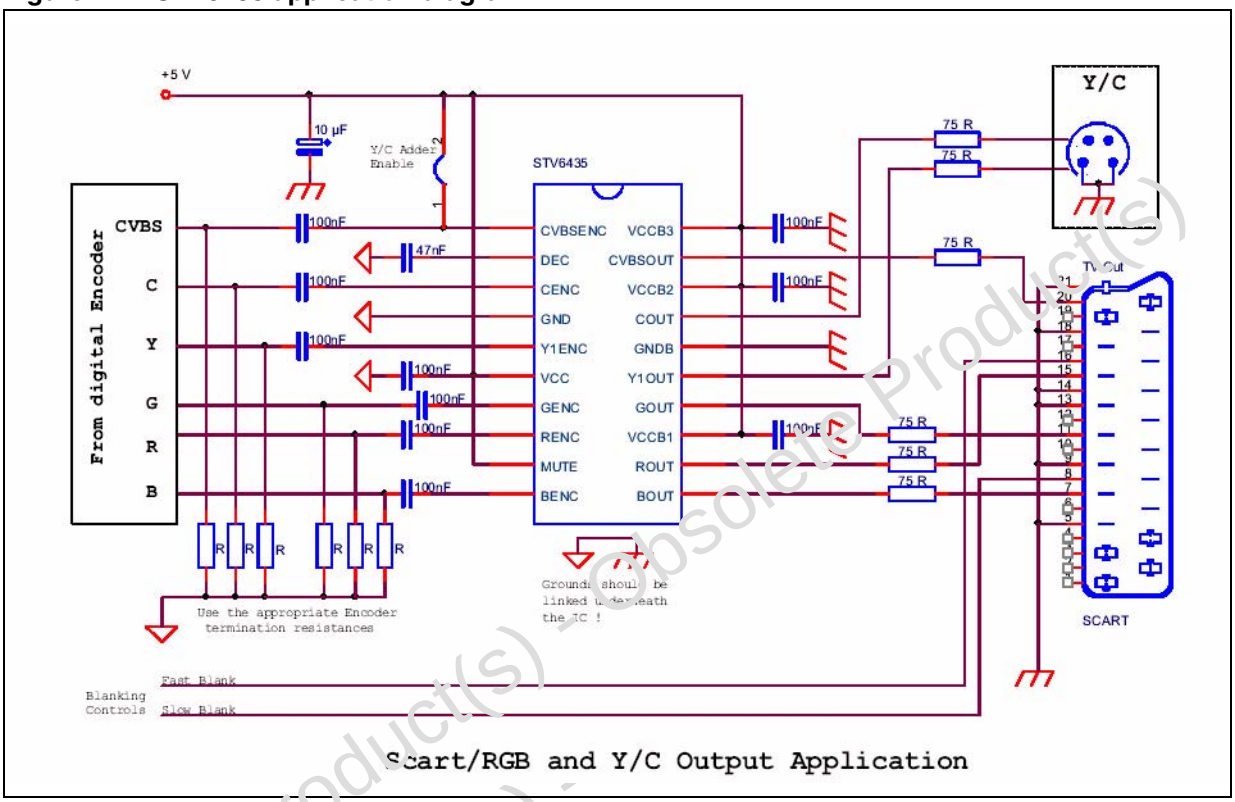
Table 10. Power supply connections

Supply	Description
VCCB1	GOUT, ROUT and BOUT supply
VCCB2	YOUT 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 11. STV6435 application diagram



5 Package mechanical data

Figure 12. 24-pin plastic small outline package (SO24)

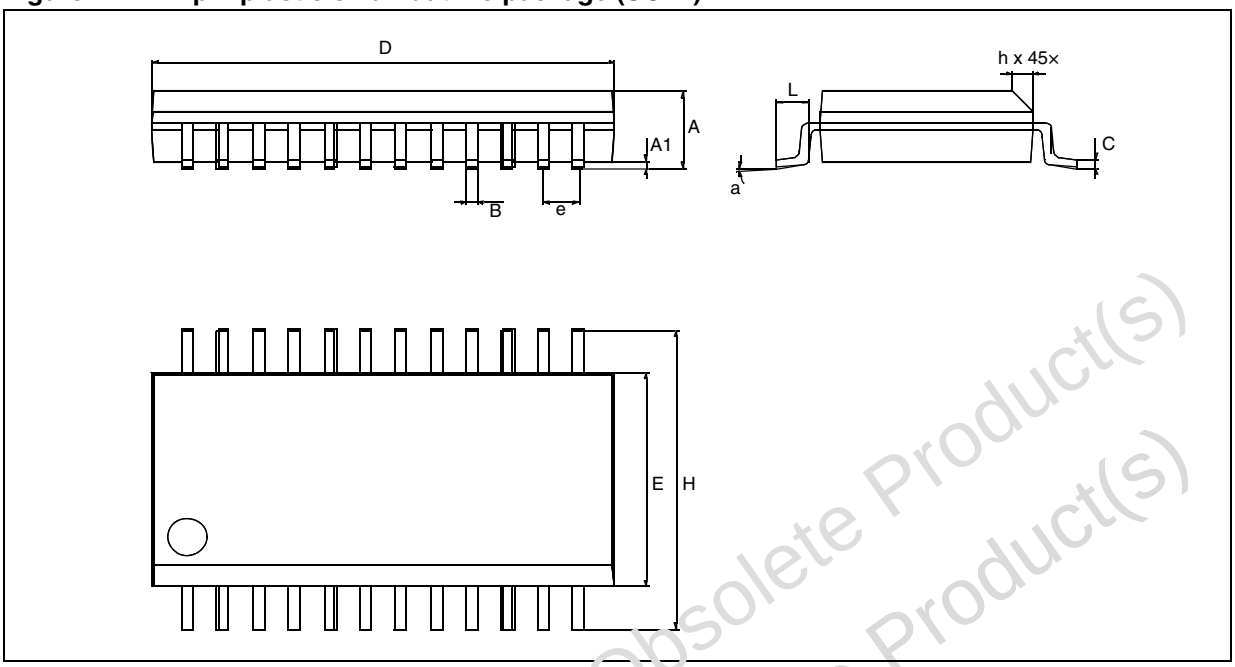


Table 11. SO24 dimensions

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 11: STV6435 application diagram*, Modification of *Figure 2: STV6435 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: STV6435 block diagram* and active channel and mute values in *Section 2.3: Recommended operating conditions*.
24-May-2005	1.1	Removed DIP20 package information.
28-Mar-2007	1.2	Reformatted to new corporate template. Addition of disclaimer for *Figure 11: STV6435 application diagram*.
16-Mar-2009	2	New template applied, *Section 5.1: Environmentally-friendly packages* added

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