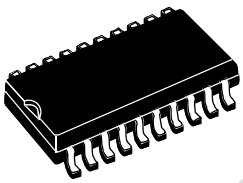
STV6415D

Bus-controlled video matrix switch

Features

- 20 MHz bandwidth
- Cascadable with another STV6415D (internal address can be changed by pin 7 voltage)
- 8 inputs (CVBS, RGB, chroma, …)
- 6 outputs
- Possibility of chroma signal for each Input by switching off the clamp with an external resistor bridge
- I²C bus-controlled
- 6.5 dB gain between any input and output
- –55 dB crosstalk at 5 MHz
- Full ESD protection



SO 20
(Plastic small outline package)

Table 1. Device summary

Order code	Packaging
STV6415DD	Tray

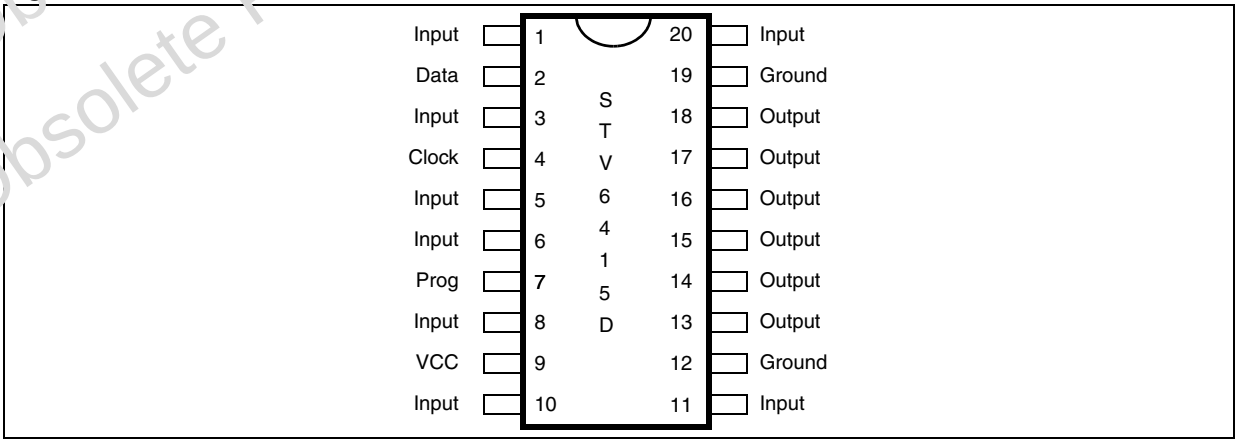
Description

The main function of the STV6415D is to switch eight video input sources on the six outputs.

Each output can be switched to only one of the inputs, whereas any single input may be connected to several outputs.

All switching possibilities are controlled through the I²C bus.

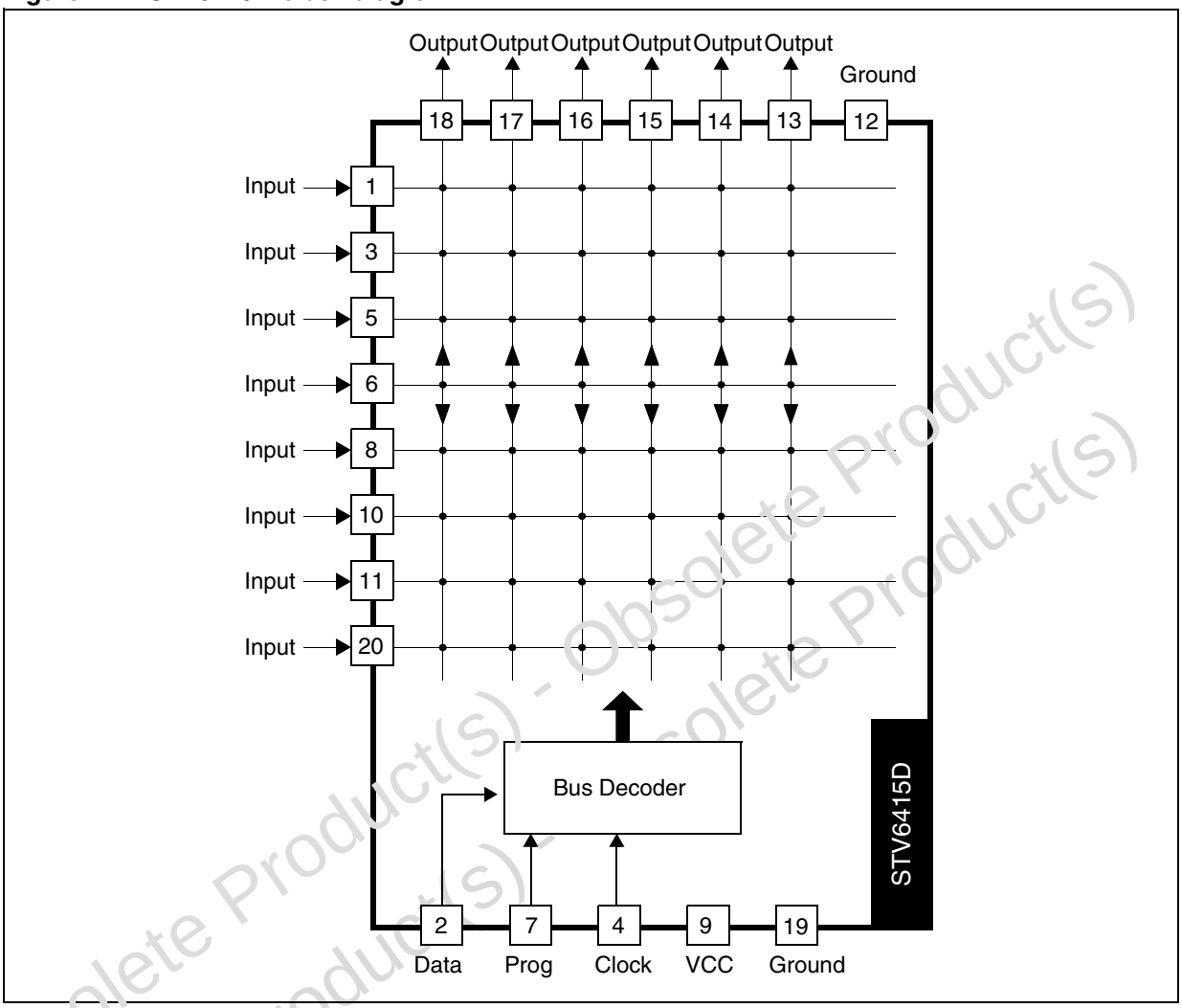
Figure 1. STV6415D



Contents

1 Introduction

Figure 2. STV6415D block diagram



The main function of the STV6415D is to switch eight video input sources on the six outputs. Each output can be switched to only one of the inputs, whereas any single input may be connected to several outputs. The lowest level of each signal is aligned on each input (bottom of sync pulse for CVBS or Black Level for RGB signals).

The nominal gain between any input and output is 6.5 dB. For Chroma signals, the alignment is switched off by forcing, with an external 5 V_{DC} resistor bridge on the input. Each input can be used as a normal input or as a Chroma input (with external resistor bridge). All the switching possibilities are changed through the I²C bus.

Driving a 75 Ω load requires an external transistor.

The switch configuration is defined by words of 16 bits: the I²C address (8 bits) then one output configuration (8 bits). Therefore, six separated words of 16 bits are necessary to determine the starting configuration at power-on (power supply: 0 to 10 V).

A new configuration needs only the words (16 bits) of the changed output channels.

2 Electrical characteristics

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage (pin 9)	12	V
T_A	Operating ambient temperature range	0 to +70	°C
T_{STG}	Storage temperature range	–20 to +150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJA}	Junction-to-ambient thermal resistance	100	°C/W

Table 4. Electrical characteristics

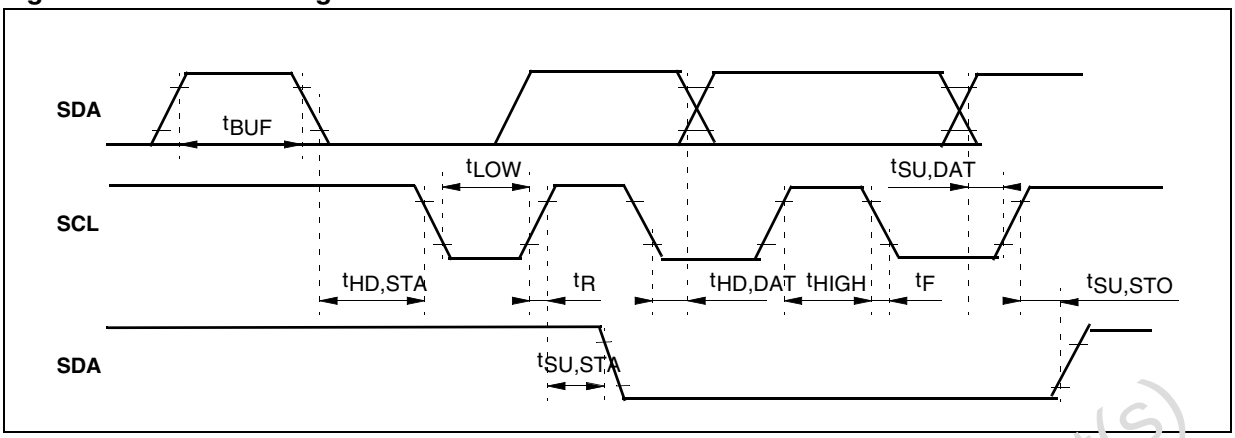
Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply voltage (pin 9)	8	10	11	V
I_{CC}	Power supply current (without load on outputs, V_{CC} = 10 V)	14	19	25	mA
Inputs					
	Signal amplitude (CVBS signal)			2	V_{PP}
	Input current (input voltage = 5 V_{DC})		1	3	µA
	DC level	3.3	3.6	3.9	V
	DC level shift (temperature from 0 to 70°C)		5	100	mV
Outputs (V_{IN} = 1 V_{PP} for all dynamic tests) Pins 13,14, 15, 16, 17 and 18					
	Dynamic	4.5	5.5		V_{PP}
	Output impedance		25	50	Ω
	Gain	6	6.5	7	dB
	Bandwidth –1dB attenuation –3dB attenuation	7	15 20		MHz
	Crosstalkf = 3.58 MHz f = 5 MHz		–60 –55	–50 –45	dB
	DC Level	2.40	3.05	3.50	V
	Minimum output load (R_{LOAD})	2			kΩ

Note: T_A = 25 °C , V_{CC} = 10 V , R_{LOAD} = 10 kΩ, C_{LOAD} = 3 pF (unless otherwise specified).

Table 5. I^2C bus characteristics

Symbol	Parameter	Test conditions	Min.	Max.	Unit
PROG (pin 7)					
	Threshold voltage (typical value is 1.3)		1.00	1.65	V
SCL (pin 4)					
V_{IL}	Low level input voltage		–0.3	+1.0	V
V_{IH}	High level input voltage		2.3	V_{CC} + 0.3	V
I_{LI}	Input leakage current	V_I = 0 to V_{CC}	–10	+10	µA
f_{SCL}	Clock frequency		0	100	kHz
t_R	Input rise time	1.5 V to 3 V		1000	ns
t_F	Input fall time	3 V to 1.5 V		300	ns
C_I	Input capacitance			10	pF
SDA (pin 2)					
V_{IL}	Low level input voltage		–0.3	+1.0	V
V_{IH}	High level input voltage		2.3	V_{CC} + 0.3	V
I_{LI}	Input leakage current	V_I = 0 to V_{CC}	–10	+10	µA
C_I	Input capacitance			10	pF
t_R	Input rise time	1.5 V to 3 V		1000	ns
t_F	Input fall time	3 V to 1.5 V		300	ns
V_{OL}	Low level output voltage	I_{OL} = 3mA		0.4	V
t_F	Output fall time	3 V to 1.5 V		250	ns
C_L	Load capacitance			400	pF
Timing					
t_{LOW}	Clock low period		4.7		µs
t_{HIGH}	Clock high period		4.0		µs
$t_{SU, DAT}$	Data set-up time		250		ns
$t_{HD, DAT}$	Data hold time		0	340	ns
$t_{SU, STO}$	Set-up time from clock high to stop		4.0		µs
t_{BUF}	Start set-up time following a stop		4.7		µs
$t_{HD, STA}$	Start hold time		4.0		µs
$t_{SU, STA}$	Start set-up time following clock low-to-high transition		4.7		µs

Figure 3. I²C bus timing



2.1 I²C bus selections

The I²C chip address is defined by the first byte. The second and following bytes define the input/output configurations.

First byte (address)

0x86	0b1000 0110	When PROG pin is connected to Ground
0x06	0b0000 0110	When PROG pin is connected to V_{CC}

Second and following bytes (input/output selection)

Table 6. I²C bus output selections

Output address (MSB)	Input address (LSB)	Selected output	
00000	XXX	Pin 18	Output is selected by the 5 MSBs.
00100	XXX	Pin 14	
00010	XXX	Pin 16	
00110	---	Not used	
00001	XXX	Pin 17	
00101	XXX	Pin 13	
00011	XXX	Pin 15	
00111	---	Not used	

Table 7. I²C bus input selections

Output address (MSB)	Input address (LSB)	Selected input	
00XXX	000	Pin 5	Input is selected by the 3 LSBs.
00XXX	100	Pin 8	
00XXX	010	Pin 3	
00XXX	110	Pin 20	
00XXX	001	Pin 6	
00XXX	101	Pin 10	
00XXX	011	Pin 1	
00XXX	111	Pin 11	

Example: 00100 101 connects pin 10 (input) to pin 14 (output) (equals 25 in nexadecimal)

2.2 Input/output pin configurations

Figure 4. Input configuration

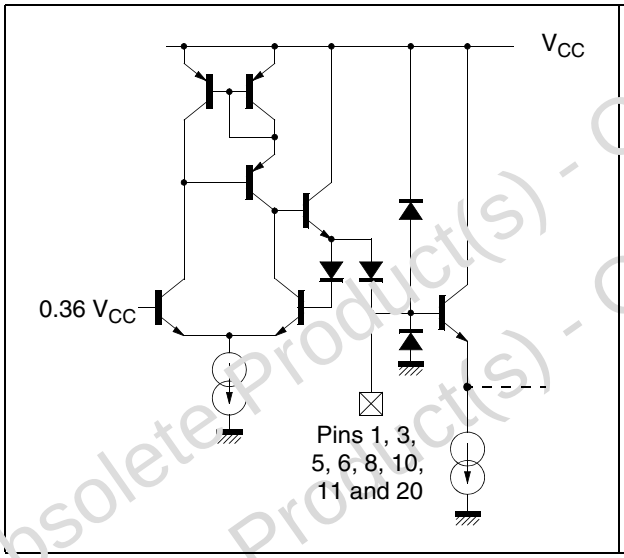


Figure 5. Output configuration

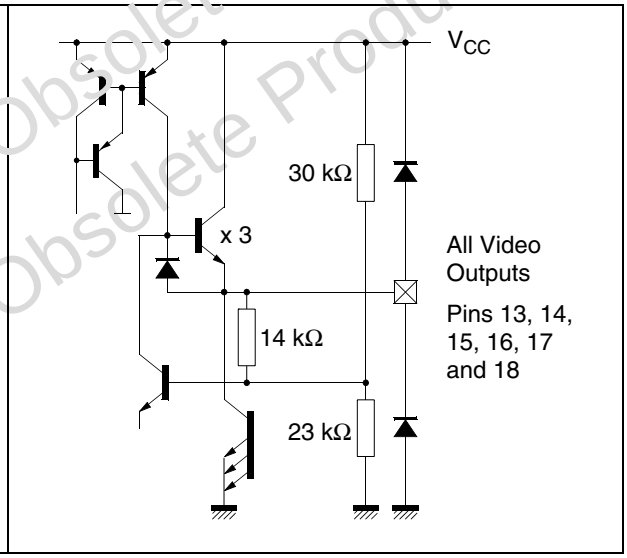


Figure 6. Bus I/O configuration

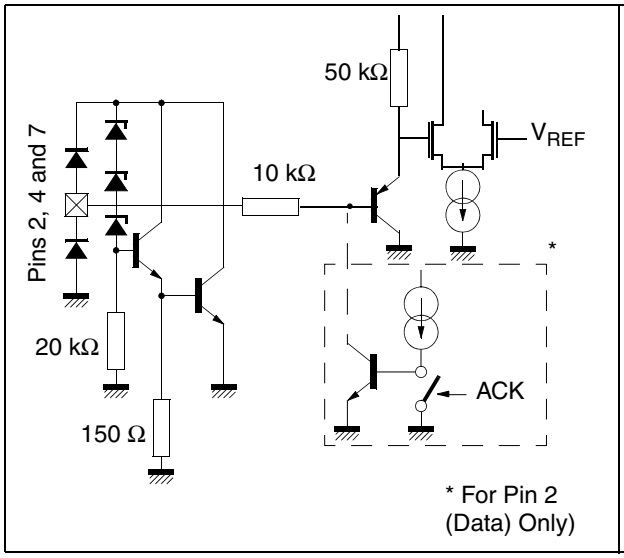
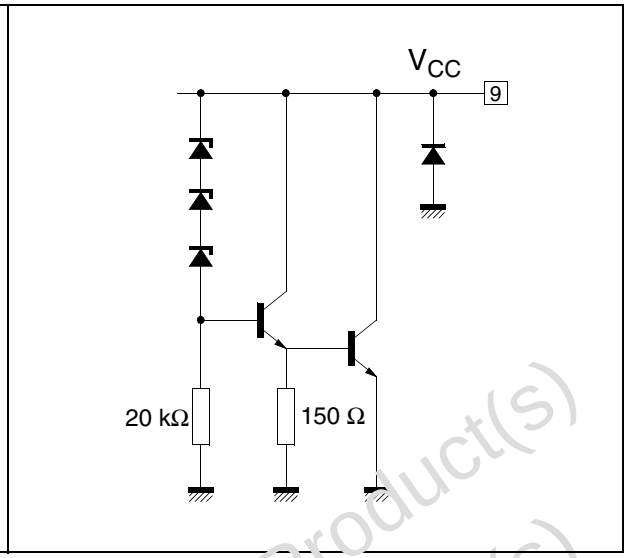


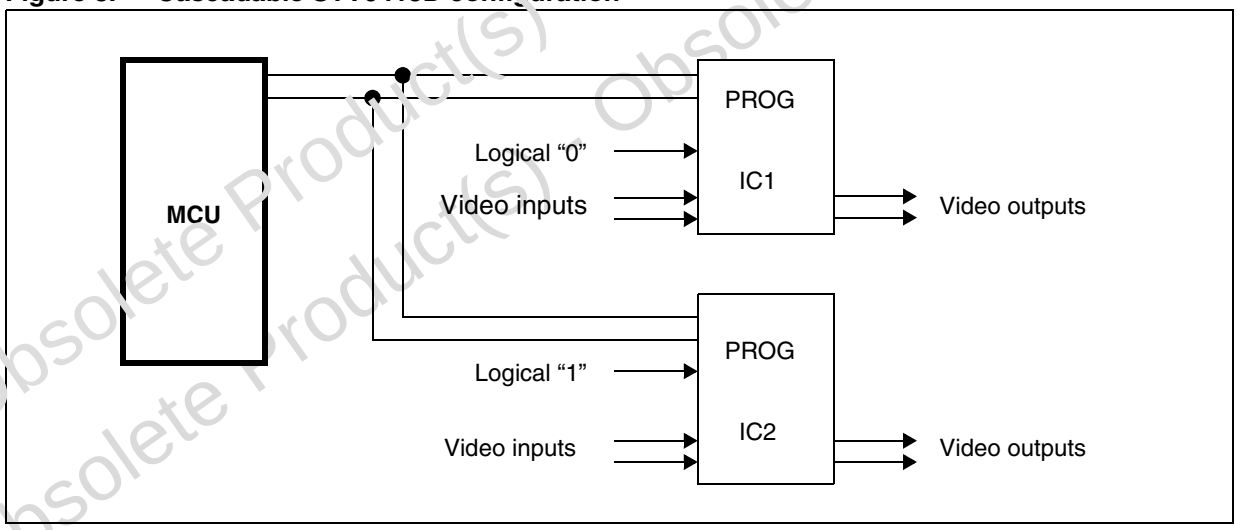
Figure 7. VCC pin configuration



2.3 Using a second STV6415D

The programming input pin (PROG) allows two STV6415D circuits to operate in parallel, and to select them independently through the I²C bus by modifying the address byte. Consequently, the switching capabilities are doubled, or IC1 and IC2 can be cascaded.

Figure 8. Cascadable STV6415D configuration

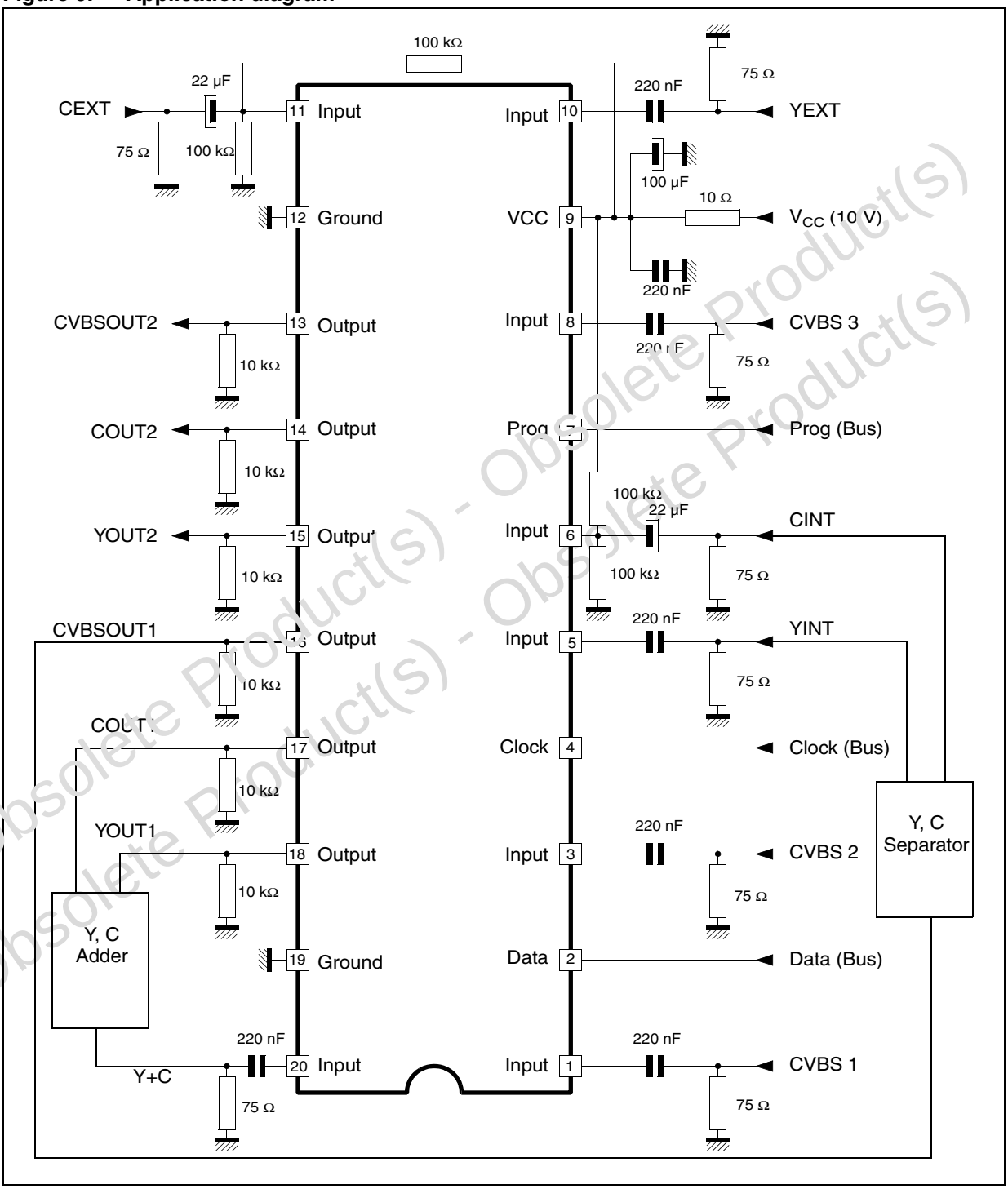


2.4 Application diagram

Whenever an input is not used, it must be bypassed to ground through a 220 nF capacitor.

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 9. Application diagram



3 Package mechanical data

Figure 10. 20-pin plastic SO (small outline) package, 300-mil width

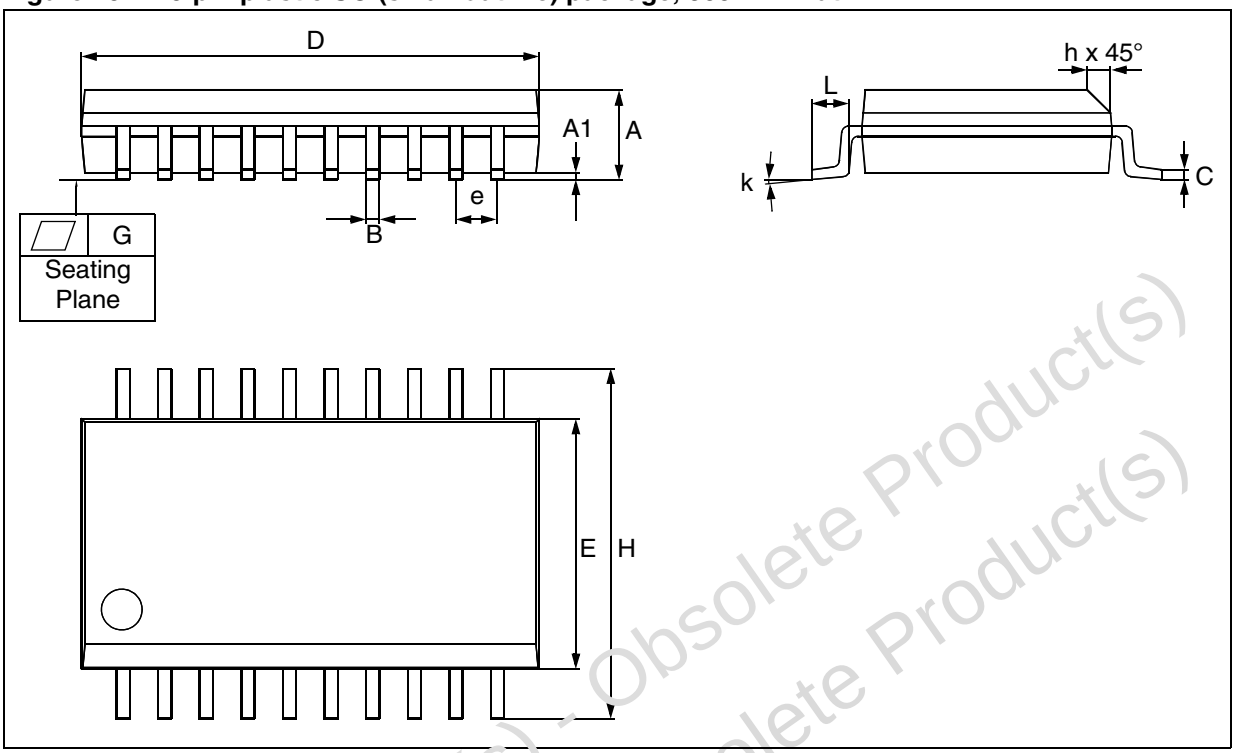


Table 8. SO20 package

Dim.	mm			inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.35		2.65	0.0926		0.1043
A1	0.10		0.30	0.0040		0.0118
B	0.33		0.51	0.0130		0.0200
C			0.32			0.0125
D	12.60		13.00	0.4961		0.5118
E	7.40		7.60	0.2914		0.2992
e		1.27			0.050	
H	10.00		10.65	0.394		0.419
h	0.25		0.74	0.010		0.029
k	0°		8°	0°		8°
L	0.40		1.27	0.016		0.050
G			0.10			0.004
	Number of pins					
N	20					

3.1 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.

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
October 2004	1.0	First issue of target specification
November 2004	1.1	Second issue
February 2005	1.2	Removed DIP20 package information
12-Mar-2009	2	Template updated, *Section 3.1* revised

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com