INTEGRATED CIRCUITS

DATA SHEET



TDA8754 Triple high speed ADC for LCD drive

Objective specification
File under Integrated Circuits, IC02

1998 Sep 30





Triple high speed ADC for LCD drive

TDA8754

FEATURES

- Triple 8-bit Analog-to-Digital Converter (ADC)
- Sampling rate up to 170 MHz
- IC controllable via a serial interface, which can be either I²C-bus or 3-wire, selected via a TTL input pin
- IC analog input 0.5 to 1.1 V (peak-to-peak value) to have full-scale ADC input
- Clamps for programming a clamp level through a clamping code between -63 and +64 by steps of 1 LSB
- Controllable gain stages: gain controlled independently on the 3 channels via the serial interface to have a full-scale resolution to 1%
- · Low gain variation at different temperatures
- · Analog bandwidth of 400 MHz
- Controllable PLL via the serial interface generates the ADC clock. It can be locked on line frequencies from 15 kHz up to 280 kHz.
- · Integrated PLL divider
- Integrated clamp pulse and H and V LCD control pulses generation (independently adjustable in position and duration). Also a data enable signal can be generated, independently adjustable in position and duration with respect to HSYNC.
- The pixel clock is available at half the clock frequency
- Programmable phase clock adjustment cells
- Internal voltage regulators
- · TTL compatible digital inputs
- 3.3 V CMOS compatible digital outputs
- Outputs: one port output up to 140 MHz or 2-port demultiplexed outputs on the full speed range.
 Operating mode selectable through the serial interface.
- Chip enable: high-impedance ADC output
- Power-down mode.

GENERAL DESCRIPTION

The TDA8754 is a triple 8-bit ADC with controllable gain and clamps for the digitizing of large bandwidth R, G, B signals. Clamp level, gain, and all the other settings are controlled via a serial interface (either I²C-bus or 3-wire, selected through a logic input). The gain is optimized for stability versus temperature variations.

The IC also includes a PLL that generates the ADC clock which can be locked to the horizontal line frequency. The PLL jitter is minimized for high resolution PC graphics applications. An external clock can also be used to clock the ADC.

The clamp pulse is generated on-chip, it can be adjusted in position (with respect to HSYNC) and duration through the serial interface.

The horizontal and vertical control pulses for the LCD can be adjusted in duration through the serial interface. Also a data enable signal can be generated, independently adjustable in position (with respect to HSYNC) and duration through the serial interface.

Outputs: one port output up to 140 MHz or demultiplexed 2-port outputs on the full speed range. Operating mode selectable through the serial interface.



ORDERING INFORMATION

TYPE		PACKAGE		
NUMBER	NAME	DESCRIPTION	VERSION	
TDA8754H	LQFP144	plastic low profile quad flat package; 144 leads; body 20 × 20 × 1.4 mm	SOT486-1	

Philips Semiconductors Objective specification

Triple high speed ADC for LCD drive

TDA8754

QUICK REFERENCE DATA

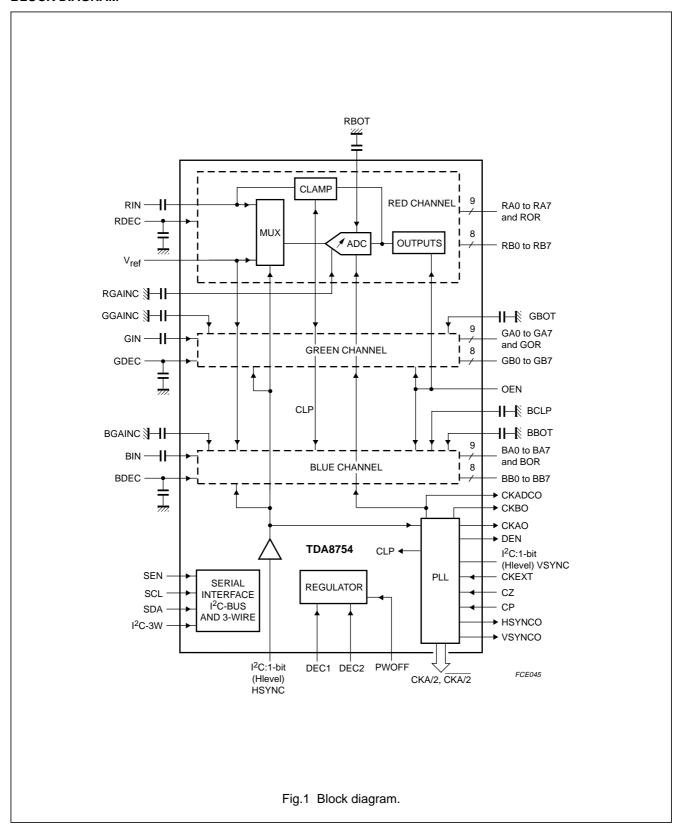
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _{CCA}	analog supply voltage for R, G, B channels		4.75	5.0	5.25	V
V _{DD}	logic supply voltage for I ² C-bus and 3-wire interface		3.0	5.0	5.25	V
V _{CCD}	digital supply voltage		4.75	5.0	5.25	V
V _{CC(O)}	output stages supply voltage for R, G, B channels		3.0	3.3	3.6	V
V _{CCA(PLL)}	analog PLL supply voltage		4.75	5.0	5.25	V
V _{CC(O)(PLL)}	output PLL supply voltage		4.75	5.0	5.25	V
I _{CCA}	analog supply current for R, G, B channels		_	tbf	_	mA
I _{DD}	logic supply current for I ² C-bus and 3-wire interface		_	tbf	_	mA
I _{CCD}	digital supply current		_	tbf	_	mA
I _{CC(O)}	output stages supply current for R, G, B channels		_	tbf	_	mA
I _{CCA(PLL)}	analog PLL supply current		_	tbf	_	mA
I _{CC(O)(PLL)}	output PLL supply current		_	tbf	_	mA
INL	DC integral non-linearity		_	±1	±1.5	LSB
DNL	DC differential non-linearity		_	±0.5	±0.8	LSB
ΔG_{amp}	gain stability versus temperature	V _{ref} = 2.5 V with 100 ppm/K variation	_	_	200	ppm/K
t _{set}	setting time of the block ADC + AGC	input signal setting time <1 ns; setting to 1%; f _i = 85 MHz	_	2.5	3.5	ns
f _{clk(max)}	maximum conversion rate		170	_	_	MHz
f _{ref}	PLL reference clock frequency		15	_	120	kHz
f _{PLL}	output clock frequency		12		170	MHz
JPLL(rms)	maximum PLL phase jitter (RMS value)		_	0.2	_	ns
D/D _{PLL}	PLL divider ratio		512	_	4095	
P _{tot}	total power consumption $f_{clk} = 170 \text{ MHz}$; ramp		_	tbf	1.2	W

1998 Sep 30 3

Triple high speed ADC for LCD drive

TDA8754

BLOCK DIAGRAM



1998 Sep 30 4

Philips Semiconductors Objective specification

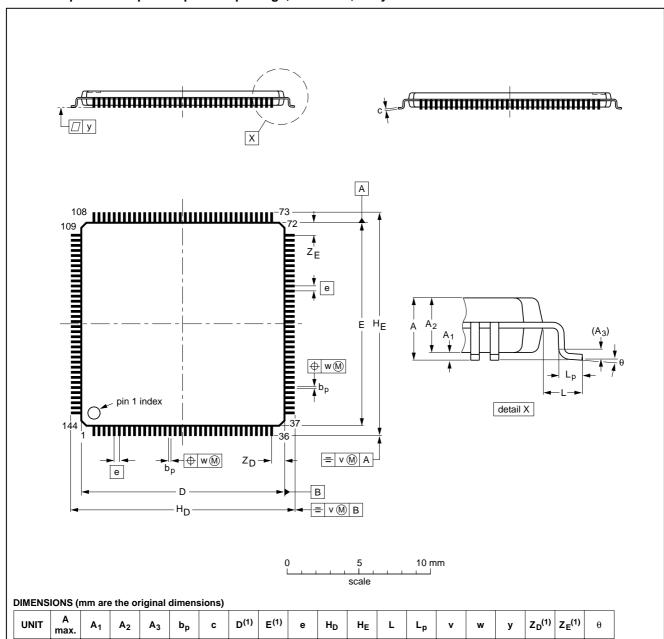
Triple high speed ADC for LCD drive

TDA8754

PACKAGE OUTLINE

LQFP144: plastic low profile quad flat package; 144 leads; body 20 x 20 x 1.4 mm

SOT486-1



mm

0.15

0.05

1.6

1.45

1.35

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

0.27

0.17

0.25

0.20

0.09

20.1

19.9

20.1

19.9

OUTLINE		REFERENCES			EUROPEAN	ISSUE DATE	
VERSION	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE	
SOT486-1						97-08-04	

22.15

21.85

0.50

22.15 21.85 0.75

1.0

1.40

1.10

1998 Sep 30 5

Triple high speed ADC for LCD drive

TDA8754

SOLDERING

Introduction

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mounted components are mixed on one printed-circuit board. However, wave soldering is not always suitable for surface mounted ICs, or for printed-circuits with high population densities. In these situations reflow soldering is often used.

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our "Data Handbook IC26; Integrated Circuit Packages" (order code 9398 652 90011).

Reflow soldering

Reflow soldering techniques are suitable for all LQFP packages.

Reflow soldering requires solder paste (a suspension of fine solder particles, flux and binding agent) to be applied to the printed-circuit board by screen printing, stencilling or pressure-syringe dispensing before package placement.

Several methods exist for reflowing; for example, infrared/convection heating in a conveyor type oven. Throughput times (preheating, soldering and cooling) vary between 50 and 300 seconds depending on heating method. Typical reflow peak temperatures range from 215 to 250 °C.

Wave soldering

Wave soldering is **not** recommended for LQFP packages. This is because of the likelihood of solder bridging due to closely-spaced leads and the possibility of incomplete solder penetration in multi-lead devices.

CAUTION

Wave soldering is NOT applicable for all LQFP packages with a pitch (e) equal or less than 0.5 mm.

If wave soldering cannot be avoided, for LQFP packages with a pitch (e) larger than 0.5 mm, the following conditions must be observed:

- A double-wave (a turbulent wave with high upward pressure followed by a smooth laminar wave) soldering technique should be used.
- The footprint must be at an angle of 45° to the board direction and must incorporate solder thieves downstream and at the side corners.

During placement and before soldering, the package must be fixed with a droplet of adhesive. The adhesive can be applied by screen printing, pin transfer or syringe dispensing. The package can be soldered after the adhesive is cured.

Maximum permissible solder temperature is 260 °C, and maximum duration of package immersion in solder is 10 seconds, if cooled to less than 150 °C within 6 seconds. Typical dwell time is 4 seconds at 250 °C.

A mildly-activated flux will eliminate the need for removal of corrosive residues in most applications.

Repairing soldered joints

Fix the component by first soldering two diagonally-opposite end leads. Use only a low voltage soldering iron (less than 24 V) applied to the flat part of the lead. Contact time must be limited to 10 seconds at up to 300 $^{\circ}$ C. When using a dedicated tool, all other leads can be soldered in one operation within 2 to 5 seconds between 270 and 320 $^{\circ}$ C.

Philips Semiconductors Objective specification

Triple high speed ADC for LCD drive

TDA8754

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	

Limiting values

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

Where application information is given, it is advisory and does not form part of the specification.

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

7

PURCHASE OF PHILIPS I2C COMPONENTS



Purchase of Philips I²C components conveys a license under the Philips' I²C patent to use the components in the I²C system provided the system conforms to the I²C specification defined by Philips. This specification can be ordered using the code 9398 393 40011.

1998 Sep 30

Philips Semiconductors – a worldwide company

Argentina: see South America

Australia: 34 Waterloo Road, NORTH RYDE, NSW 2113,

Tel. +61 2 9805 4455, Fax. +61 2 9805 4466

Austria: Computerstr. 6, A-1101 WIEN, P.O. Box 213, Tel. +43 160 1010,

Fax. +43 160 101 1210

Belarus: Hotel Minsk Business Center, Bld. 3, r. 1211, Volodarski Str. 6,

220050 MINSK, Tel. +375 172 200 733, Fax. +375 172 200 773

Belgium: see The Netherlands Brazil: see South America

Bulgaria: Philips Bulgaria Ltd., Energoproject, 15th floor, 51 James Bourchier Blvd., 1407 SOFIA, Tel. +359 2 689 211, Fax. +359 2 689 102

Canada: PHILIPS SEMICONDUCTORS/COMPONENTS,

Tel. +1 800 234 7381

China/Hong Kong: 501 Hong Kong Industrial Technology Centre,

72 Tat Chee Avenue, Kowloon Tong, HONG KONG,

Tel. +852 2319 7888, Fax. +852 2319 7700

Colombia: see South America Czech Republic: see Austria

Denmark: Prags Boulevard 80, PB 1919, DK-2300 COPENHAGEN S,

Tel. +45 32 88 2636, Fax. +45 31 57 0044 Finland: Sinikalliontie 3, FIN-02630 ESPOO, Tel. +358 9 615800, Fax. +358 9 61580920

France: 51 Rue Carnot, BP317, 92156 SURESNES Cedex,

Tel. +33 1 40 99 6161, Fax. +33 1 40 99 6427

Germany: Hammerbrookstraße 69, D-20097 HAMBURG,

Tel. +49 40 23 53 60, Fax. +49 40 23 536 300

Greece: No. 15, 25th March Street, GR 17778 TAVROS/ATHENS,

Tel. +30 1 4894 339/239, Fax. +30 1 4814 240

Hungary: see Austria

India: Philips INDIA Ltd, Band Box Building, 2nd floor, 254-D, Dr. Annie Besant Road, Worli, MUMBAI 400 025,

Tel. +91 22 493 8541, Fax. +91 22 493 0966

Indonesia: PT Philips Development Corporation, Semiconductors Division,

Gedung Philips, Jl. Buncit Raya Kav.99-100, JAKARTA 12510, Tel. +62 21 794 0040 ext. 2501, Fax. +62 21 794 0080

Ireland: Newstead, Clonskeagh, DUBLIN 14 Tel. +353 1 7640 000, Fax. +353 1 7640 200

Israel: RAPAC Electronics, 7 Kehilat Saloniki St, PO Box 18053, TEL AVIV 61180, Tel. +972 3 645 0444, Fax. +972 3 649 1007

Italy: PHILIPS SEMICONDUCTORS, Piazza IV Novembre 3, 20124 MILANO, Tel. +39 2 6752 2531, Fax. +39 2 6752 2557

Japan: Philips Bldg 13-37, Kohnan 2-chome, Minato-ku, TOKYO 108-8507, Tel. +81 3 3740 5130, Fax. +81 3 3740 5077

Korea: Philips House, 260-199 Itaewon-dong, Yongsan-ku, SEOUL,

Tel. +82 2 709 1412, Fax. +82 2 709 1415

Malaysia: No. 76 Jalan Universiti, 46200 PETALING JAYA, SELANGOR,

Tel. +60 3 750 5214, Fax. +60 3 757 4880

Mexico: 5900 Gateway East, Suite 200, EL PASO, TEXAS 79905,

Tel. +9-5 800 234 7381

Middle East: see Italy

Netherlands: Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB,

Tel. +31 40 27 82785, Fax. +31 40 27 88399

New Zealand: 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,

Tel. +64 9 849 4160, Fax. +64 9 849 7811 Norway: Box 1, Manglerud 0612, OSLO, Tel. +47 22 74 8000, Fax. +47 22 74 8341

Pakistan: see Singapore

Philippines: Philips Semiconductors Philippines Inc., 106 Valero St. Salcedo Village, P.O. Box 2108 MCC, MAKATI, Metro MANILA, Tel. +63 2 816 6380, Fax. +63 2 817 3474

Poland: UI. Lukiska 10, PL 04-123 WARSZAWA, Tel. +48 22 612 2831, Fax. +48 22 612 2327

Portugal: see Spain Romania: see Italy

Russia: Philips Russia, UI. Usatcheva 35A, 119048 MOSCOW,

Tel. +7 095 755 6918, Fax. +7 095 755 6919

Singapore: Lorong 1, Toa Payoh, SINGAPORE 319762,

Tel. +65 350 2538, Fax. +65 251 6500

Slovakia: see Austria Slovenia: see Italy

South Africa: S.A. PHILIPS Pty Ltd., 195-215 Main Road Martindale,

2092 JOHANNESBURG, P.O. Box 7430 Johannesburg 2000,

Tel. +27 11 470 5911, Fax. +27 11 470 5494 South America: Al. Vicente Pinzon, 173, 6th floor,

04547-130 SÃO PAULO, SP, Brazil, Tel. +55 11 821 2333, Fax. +55 11 821 2382

Spain: Balmes 22, 08007 BARCELONA Tel. +34 93 301 6312, Fax. +34 93 301 4107

Sweden: Kottbygatan 7, Akalla, S-16485 STOCKHOLM,

Tel. +46 8 5985 2000, Fax. +46 8 5985 2745 Switzerland: Allmendstrasse 140, CH-8027 ZÜRICH,

Taiwan: Philips Semiconductors, 6F, No. 96, Chien Kuo N. Rd., Sec. 1,

TAIPEI, Taiwan Tel. +886 2 2134 2865, Fax. +886 2 2134 2874

Thailand: PHILIPS ELECTRONICS (THAILAND) Ltd.

209/2 Sanpavuth-Bangna Road Prakanong, BANGKOK 10260,

Tel. +66 2 745 4090, Fax. +66 2 398 0793

Tel. +41 1 488 2741 Fax. +41 1 488 3263

Turkey: Talatpasa Cad. No. 5, 80640 GÜLTEPE/ISTANBUL,

Tel. +90 212 279 2770. Fax. +90 212 282 6707

Ukraine: PHILIPS UKRAINE, 4 Patrice Lumumba str., Building B, Floor 7,

252042 KIEV, Tel. +380 44 264 2776, Fax. +380 44 268 0461

United Kingdom: Philips Semiconductors Ltd., 276 Bath Road, Hayes, MIDDLESEX UB3 5BX, Tel. +44 181 730 5000, Fax. +44 181 754 8421

United States: 811 East Arques Avenue, SUNNYVALE, CA 94088-3409,

Tel. +1 800 234 7381

Uruguay: see South America Vietnam: see Singapore

Yugoslavia: PHILIPS, Trg N. Pasica 5/v, 11000 BEOGRAD,

Tel. +381 11 625 344, Fax.+381 11 635 777

For all other countries apply to: Philips Semiconductors, International Marketing & Sales Communications, Building BE-p, P.O. Box 218, 5600 MD EINDHOVEN, The Netherlands, Fax. +31 40 27 24825

© Philips Electronics N.V. 1998

SCA60

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Printed in The Netherlands

545104/750/01/pp8

Date of release: 1998 Sep 30

Document order number: 9397 750 04134

Let's make things better.

Internet: http://www.semiconductors.philips.com





