TDA8601

RGB/YUV and fast blanking switch

Rev. 03 — 23 September 2004 Product data sheet

1. General description

The device is intended for switching between two RGB or YUV video sources. The outputs can be set to a high-impedance state to enable parallel connection of several devices.

A HIGH level on SEL (pin 5) selects the video inputs of channel 2. The IOCNTR control pin (pin 16) defines the 3-state outputs and clamp inputs:

- HIGH = 3-state outputs (also for test; active clamp)
- LOW = passive clamp at the video inputs (diode)
- Sandcastle: the video signal is clamped with an active clamp during the sync pulse.

2. Features

- YUV/RGB and fast blanking switch
- 3-state output
- Selectable clamp:
  - Passive (with diodes) or
  - Active clamp.
- Bandwidth greater than 22 MHz
- Fully ESD protected
- Latch-up free.

3. Applications

- Standard and high definition television sets
- Peri-television sets.

4. Quick reference data

Table 1: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_P	supply voltage		7.2	8.0	8.8	V
G_v	voltage gain		–0.5	0	+0.5	dB
B	bandwidth	at 3 dB	22	-	-	MHz
α_{ct}	crosstalk attenuation between two video channels	f_i = 5 MHz	–60	-	-	dB
T_{amb}	operating ambient temperature		0	-	70	°C

5. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
TDA8601/C2	DIP16	plastic dual in-line package; 16 leads (300 mil); long body	SOT38-1
TDA8601T/C2	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1

6. Block diagram

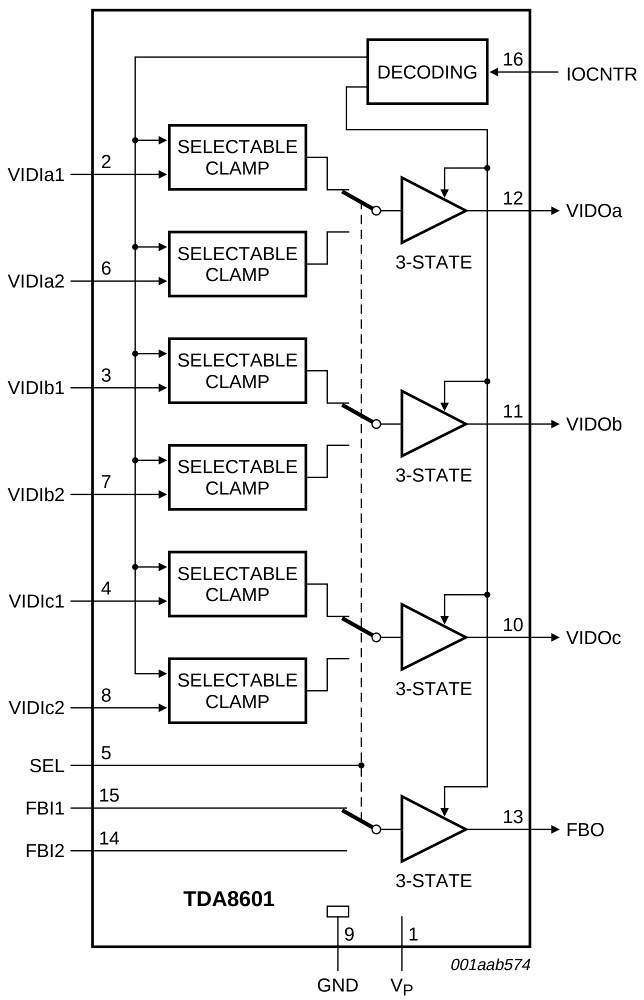


Fig 1. Block diagram.

7. Pinning information

7.1 Pinning

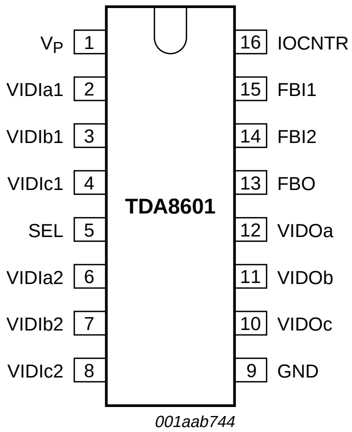


Fig 2. Pin configuration SOT38-1 (DIP16).

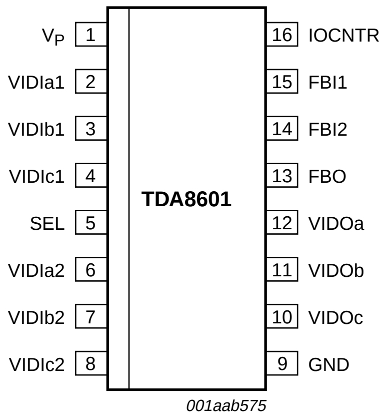


Fig 3. Pin configuration SOT109-1 (SO16).

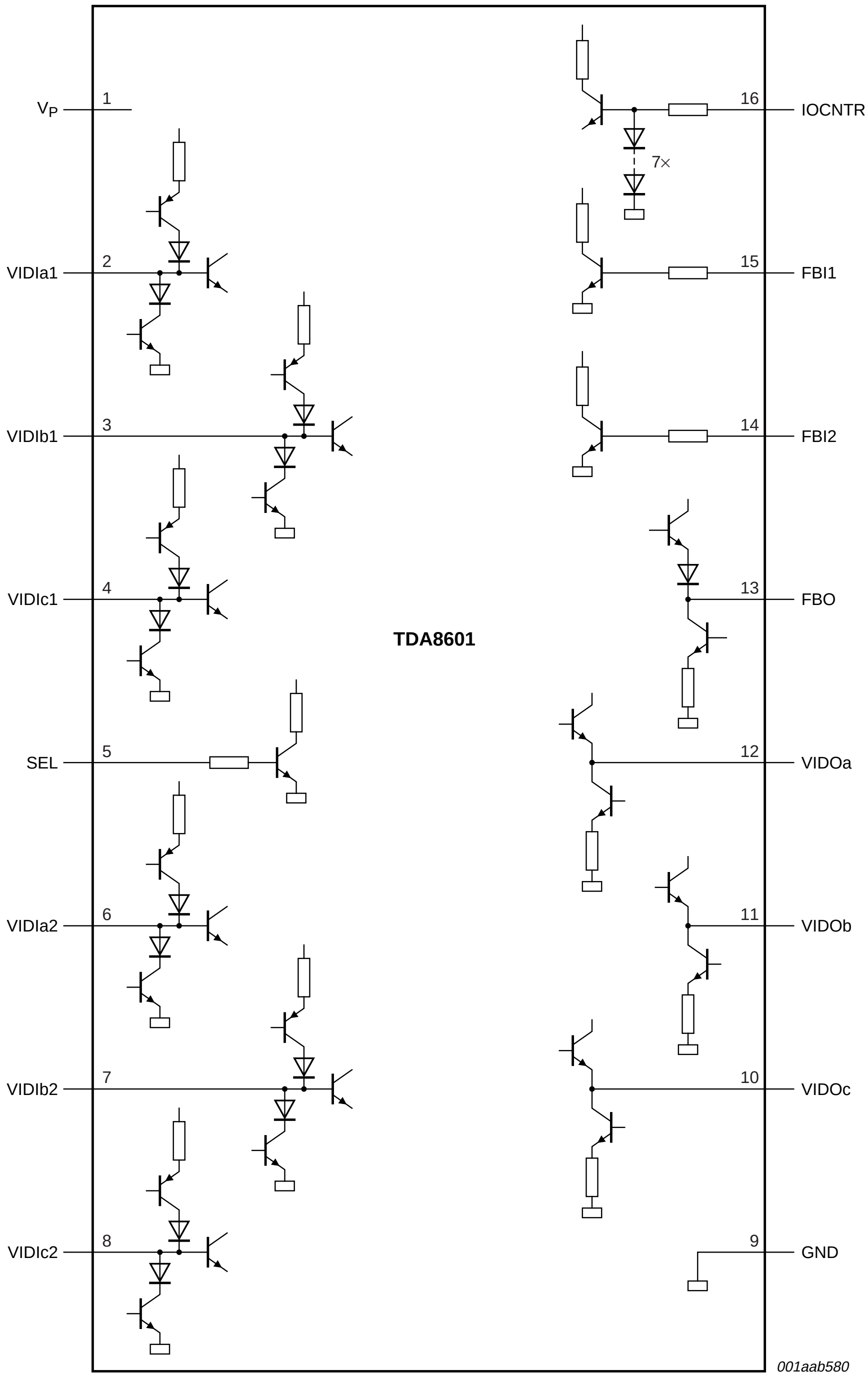
7.2 Pin description

Table 3: Pin description

Symbol	Pin	Description
V_P	1	supply voltage (8 V)
VIDIa1	2	video input a (channel 1)
VIDIb1	3	video input b (channel 1)
VIDIc1	4	video input c (channel 1)
SEL	5	channel selection
VIDIa2	6	video input a (channel 2)
VIDIb2	7	video input b (channel 2)
VIDIc2	8	video input c (channel 2)
GND	9	ground
VIDOc	10	video output c
VIDOb	11	video output b
VIDOa	12	video output a
FBO	13	fast blanking output signal
FBI2	14	fast blanking input signal (channel 2)
FBI1	15	fast blanking input signal (channel 1)
IOCNTR	16	control of video input or video output

8. Internal circuitry

Table 4: Internal circuitry

Internal pin configuration


9. Limiting values

Table 5: Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_P	supply voltage		–0.3	+9	V
V_i	input voltage (pins 2 to 4 and 6 to 8) referenced to ground		0	8.8	V
T_j	junction temperature		-	150	°C
T_{stg}	IC storage temperature		–55	+150	°C

10. Thermal characteristics

Table 6: Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		
	DIP16		70	K/W
	SO16		115	K/W

11. Characteristics

11.1 Operating characteristics

Table 7: Operating characteristics

The operating characteristics are the conditions within the IC when it is functional; these conditions can have any value. For example, condition V_{IL} (pin 5) is fixed at 0.5 V. The IC will then operate over the full temperature range and supply voltage range.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Supply						
V_P	operating supply voltage		7.2	8.0	8.8	V
Video inputs (pins 1 to 3 and 6 to 8)						
$V_{i(p-p)}$	input video signal amplitude (peak-to-peak value)	R, G, B signals	-	0.7	1	V
		Y signal; active clamp	-	1	1.4	V
		–(B – Y) signal; active clamp	-	1.05	1.5	V
		–(R – Y) signal; active clamp	-	1.33	1.9	V
C_i	input clamp capacitor		-	47	-	nF
Control inputs (pins 5 and 16)						
V_{IH}	HIGH level input voltage (pin 5)	I_{IH} = 10 μA	1.2	-	V_P	V
V_{IL}	LOW level input voltage (pin 5)	I_{IL} = –10 μA	-	-	0.5	V
V_{IH}	HIGH level input voltage (pin 16)	I_{IH} = 10 μA	2.0	-	V_P	V
V_{IL}	LOW level input voltage (pin 16)	I_{IL} = –10 μA	-	-	0.8	V

Table 7: Operating characteristics *…continued*

The operating characteristics are the conditions within the IC when it is functional; these conditions can have any value. For example, condition V_{IL} (pin 5) is fixed at 0.5 V. The IC will then operate over the full temperature range and supply voltage range.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{sc}	sandcastle input voltage level (pin 16)	zero level		-	-	1.1	V
		blanking level		2.0	-	3.1	V
		clamp level		3.9	-	5.5	V
t_W	clamp pulse width	SECAM mode		-	3.6	-	µs
		PAL mode		-	2.5	-	µs
Fast blanking inputs (pins 14 and 15)							
V_{IH}	HIGH level input voltage			1.2	-	V_P	V
V_{IL}	LOW level input voltage			-	-	0.5	V
Video outputs (pins 10 to 12)							
C_L	output load capacitor			-	-	15	pF
R_L	output load resistor		[1]	1	-	-	kΩ
Fast blanking output (pin 13)							
C_L	output load capacitor			-	40	100	pF
R_L	output load resistor		[1]	1	-	-	kΩ

[1] For the DIP16 package, the thermal resistance is lower. The minimum value for the output load resistor is 270 Ω.

11.2 Characteristics

Table 8: Characteristics

The typical values are given for V_P = 8 V; T_{amb} = 25 °C. C_L = 40 pF; no load resistor; measured in application circuit of Figure 8 over full supply voltage and temperature range; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Supply							
I_P	supply current	no resistive load on the outputs		-	33	45	mA
SVRR	supply voltage rejection ratio	f_i = 40 Hz to 50 kHz	[1]	-	-	–36	dB
		f_i = 40 Hz	[1]	-	–51	–36	dB
Video inputs (pins 1 to 3 and 4 to 6)							
R_i	input resistance	for each type of clamp		10	-	-	kΩ
$C_{i(max)}$	maximum input capacitance			-	3	-	pF
V_{clamp}	input clamping voltage level	I_i = –50 µA; passive clamp		0.8	1.21	1.35	V
		I_i = 50 µA; active clamp; V_{IOCNTR} = 3.9 V		2.05	2.42	2.70	V
		I_i = –50 µA; active clamp; V_{IOCNTR} = 3.9 V		2.05	2.37	2.70	V
I_{sink}	input sink current	V_i = 2 V; passive clamp		0.3	1.6	3	µA

Table 8: Characteristics *...continued*

The typical values are given for V_P = 8 V; T_{amb} = 25 °C. C_L = 40 pF; no load resistor; measured in application circuit of Figure 8 over full supply voltage and temperature range; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$\|I_{clamp}\|$	maximum absolute input clamping current	$V_i = V_{clamp}$ + 0.5 V; active clamp		200	-	-	µA
Video outputs (pins 10 to 12)							
R_o	output resistance			-	-	50	Ω
R_{oZ}	output resistance	3-state output		0.1	-	-	MΩ
$C_{oZ(max)}$	maximum output capacitance	3-state output		-	3	-	pF
G_v	voltage gain	f_i = 1 MHz		–0.5	0	+0.5	dB
B	bandwidth	at ±0.5 dB		5	-	-	MHz
		at ±1 dB		10	-	-	MHz
		at ±3 dB		22	40	-	MHz
α_{ct}	crosstalk attenuation between two video channels	f_i = 5 MHz	[2]	–60	-	-	dB
		f_i = 10 MHz	[2]	–50	-	-	dB
		f_i = 22 MHz	[2]	–40	-	-	dB
α_{off}	isolation of the 3-state configuration	f_i = 5 MHz	[2]	–60	-	-	dB
		f_i = 10 MHz	[2]	–50	-	-	dB
		f_i = 22 MHz	[2]	–40	-	-	dB
SR	slew rate			100	120	-	V/µs
$\|\Delta G_m\|$	gain matching between two different signals of the same channel	f_i = 5 MHz		-	-	0.5	dB
$V_{o(bl)}$	output blanking level voltage			2.1	2.23	2.7	V
$V_{os(bl)}$	output blanking offset voltage	$V_{i(ch1)}$ = 0.7 V (p-p) (white); $V_{i(ch2)}$ = 0 V (p-p) (black); active clamp	[3]	-	-	10	mV
		$V_{i(ch1)}$ = 0.7 V (p-p) (white); $V_{i(ch2)}$ = 0 V (p-p) (black); passive clamp	[3]	-	-	15	mV
$\Delta V_{os(bl)}$	matching of output blanking offset voltage	$V_{i(ch1)}$ = 0.7 V (p-p) (white); $V_{i(ch2)}$ = 0 V (p-p) (black); active clamp	[3]	-	-	10	mV
		$V_{i(ch1)}$ = 0.7 V (p-p) (white); $V_{i(ch2)}$ = 0 V (p-p) (black); passive clamp	[3]	-	-	10	mV
Fast blanking inputs (pins 14 and 15)							
Z_i	input impedance			10	-	-	kΩ
Fast blanking output (pin 13)							
V_{OH}	HIGH level output voltage			2	2.35	3	V
V_{OL}	LOW level output voltage			0	0.15	0.3	V

Table 8: Characteristics *...continued*

The typical values are given for V_P = 8 V; T_{amb} = 25 °C. C_L = 40 pF; no load resistor; measured in application circuit of Figure 8 over full supply voltage and temperature range; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Z_o	output impedance			-	-	50	Ω
SEL input (pin 5)							
Z_i	input impedance			10	-	-	kΩ
Timing							
$t_{dSEL;VID}$	delay time between SEL input and video output		[4]	-	12	20	ns
$t_{dSEL;FBO}$	delay time between SEL input and fast blanking output		[5]	-	15	40	ns
t_{SWVID}	switching time of video output		[4]	-	8.5	15	ns
t_{SWFBO}	switching time of fast blanking output		[5]	-	8.5	15	ns
t_{dFB}	fast blanking level delay between input and output		[6]	-	13	20	ns
t_{dVID}	video delay between input and output		[7]	-	4	20	ns
Δt_{dVID}	delay difference between two video signals at the output		[7]	-	0.5	10	ns
$\Delta t_{dFB;VID}$	delay difference between fast blanking level and video at the output		[7]	-	5	10	ns

[1] The supply voltage rejection ratio is measured at the video outputs (pins 10 to 12) when a sine wave is applied on the power supply pin (pin 1); where: V_{DC} = 8 V; V_i = 100 mV (p-p). This additional sine wave on the power supply pin is guaranteed not to cause extraneous oscillations on the video control and fast blanking signals.

[2] The 6 video inputs will contain the same signal. The source impedance is 50 Ω.

[3] The blanking offset is the level difference between the two channels when they are selected separately and, also, on one video output. This value is measured on each video signal.

[4] The delay between the SEL input and the video output together with the switching time of the video output is illustrated in Figure 4. The amplitude of the video signal is 1.9 V (p-p) when the clamp is active and 1.0 V (p-p) when the clamp is passive.

[5] The delay between the SEL input and fast blanking output together with the switching time of fast blanking output is illustrated in Figure 5.

[6] The fast blanking delay between input and output is illustrated in Figure 6.

[7] The video delay between input and output and delay differences are illustrated in Figure 7. Inputs 1 and 2 are either fast blanking input plus a video signal or two video signals. The amplitude of the video signal is 0.5 V (p-p). The video signal levels (i1, i2, o1 and o2) are 50% of the video amplitude. The fast blanking signal levels (i1 and o1) are 1.2 V when the signal rises and 0.5 V when the signal falls.

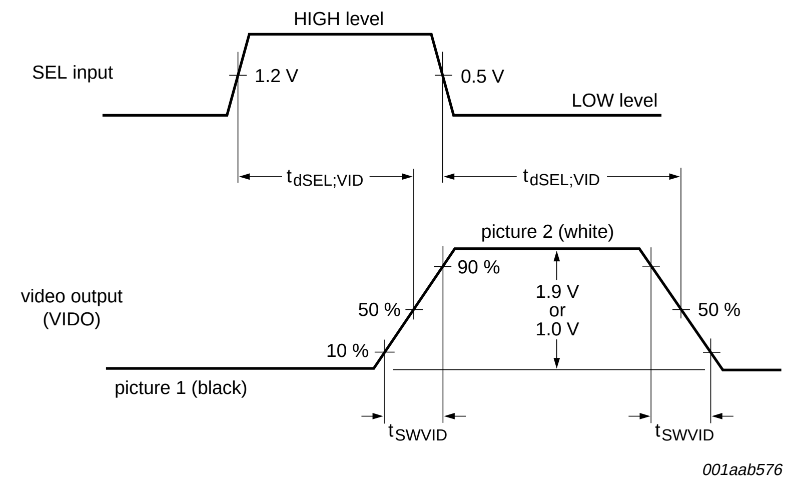


Fig 4. Timing definition: SEL and VIDO.

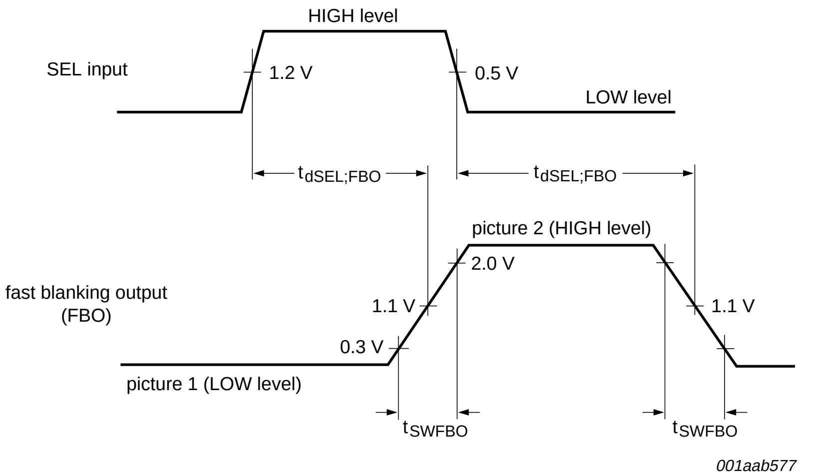


Fig 5. Timing definition: SEL and FBO.

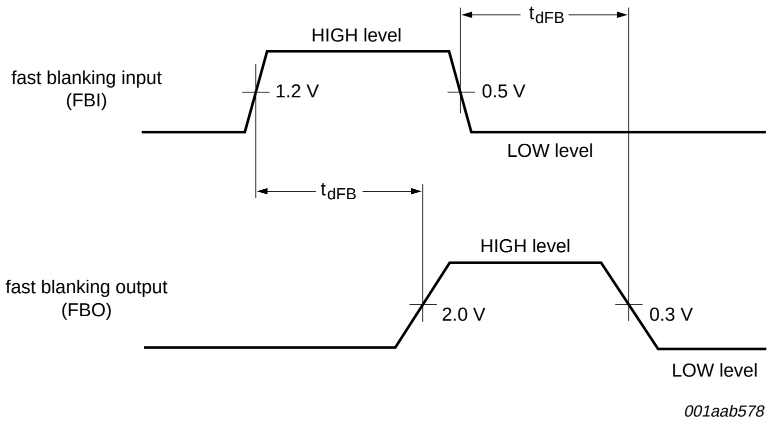


Fig 6. Timing definition: fast blanking delay.

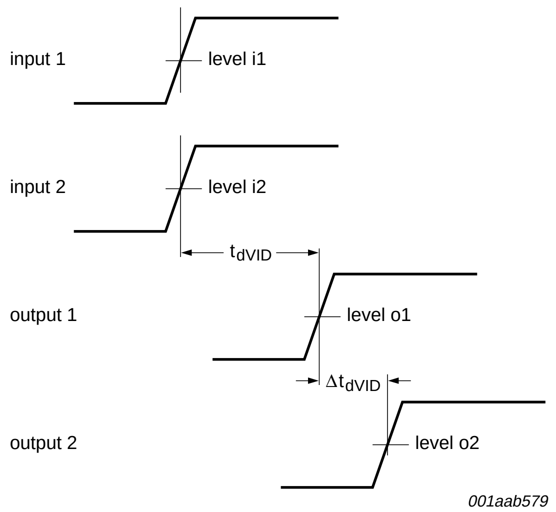


Fig 7. Timing definition: video delay.

12. Application information

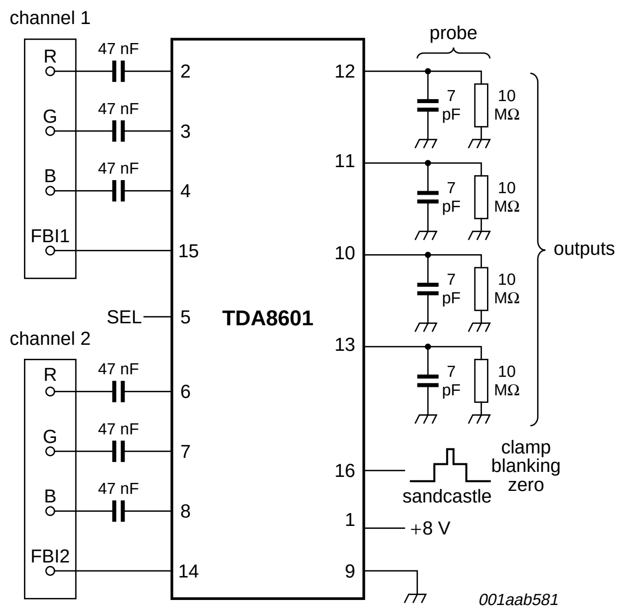


Fig 8. Application diagram.

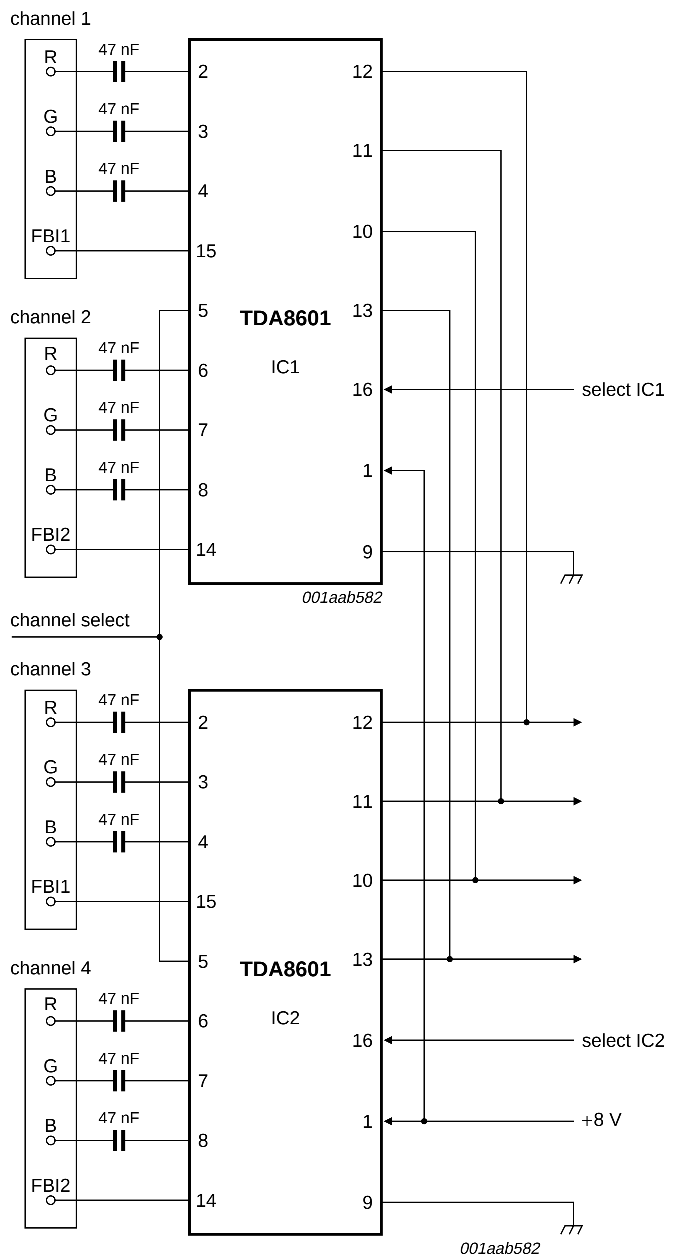
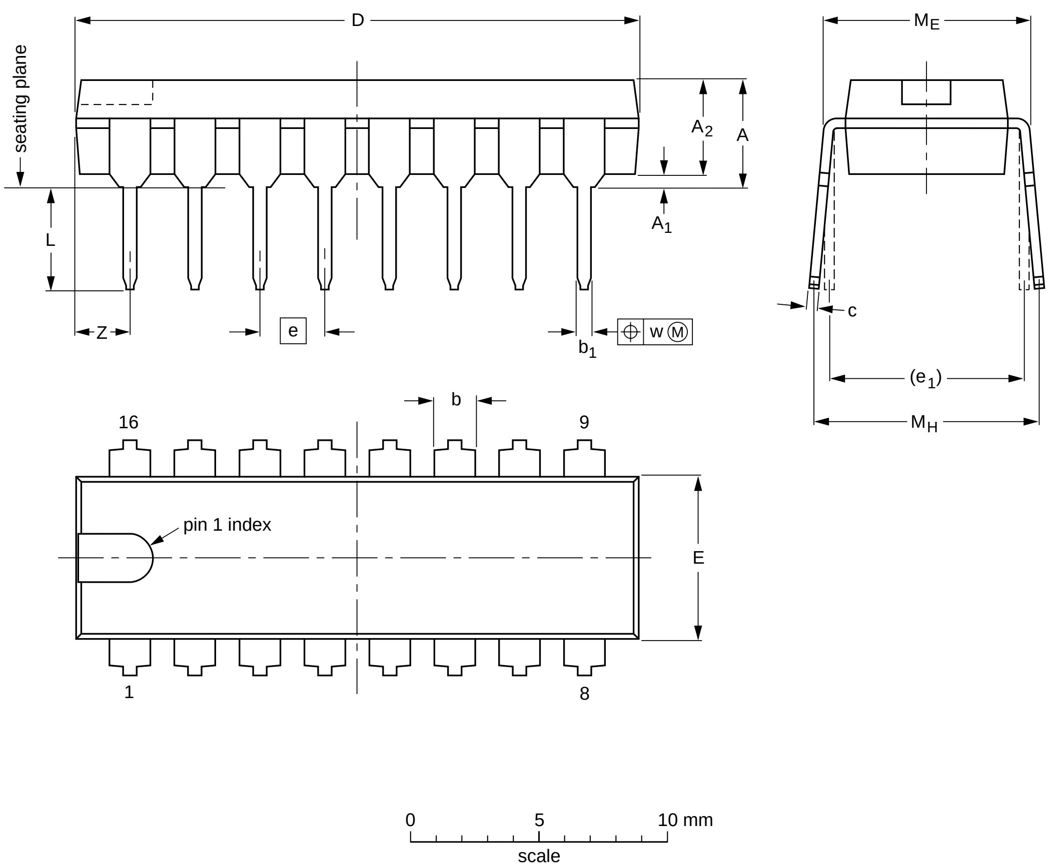


Fig 9. Schematic diagram of two TDA8601s operating four channels.

13. Package outline

DIP16: plastic dual in-line package; 16 leads (300 mil); long body **SOT38-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.7	0.51	3.7	1.40 1.14	0.53 0.38	0.32 0.23	21.8 21.4	6.48 6.20	2.54	7.62	3.9 3.4	8.25 7.80	9.5 8.3	0.254	2.2
inches	0.19	0.02	0.15	0.055 0.045	0.021 0.015	0.013 0.009	0.86 0.84	0.26 0.24	0.1	0.3	0.15 0.13	0.32 0.31	0.37 0.33	0.01	0.087

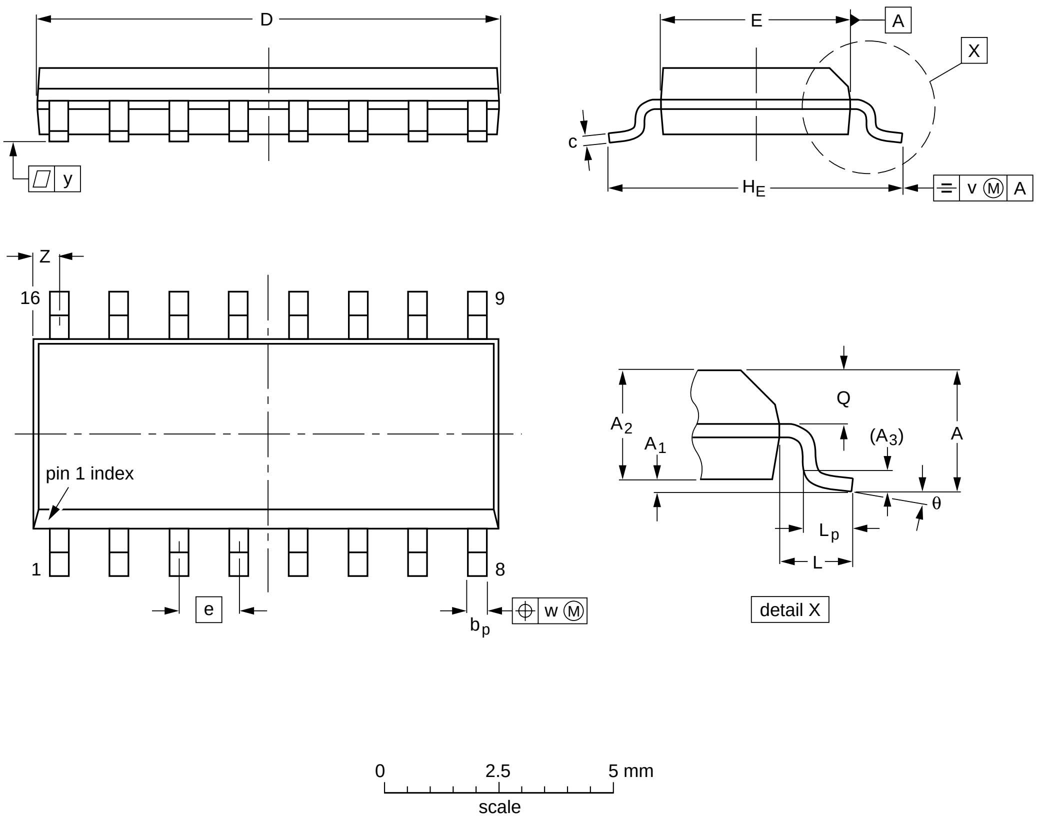
Note

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT38-1	050G09	MO-001	SC-503-16			~~99-12-27~~ 03-02-13

Fig 10. Package outline SOT38-1 (DIP16).

SO16: plastic small outline package; 16 leads; body width 3.9 mm **SOT109-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8^o 0^o
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT109-1	076E07	MS-012				~~99-12-27~~ 03-02-19

Fig 11. Package outline SOT109-1 (SO16).

14. Handling information

Inputs and outputs are protected against electrostatic discharge in normal handling. However, to be completely safe, it is desirable to take normal precautions appropriate to handling integrated circuits.

15. Soldering

15.1 Introduction

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* (document order number 9398 652 90011).

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mount components are mixed on one printed-circuit board. Wave soldering can still be used for certain surface mount ICs, but it is not suitable for fine pitch SMDs. In these situations reflow soldering is recommended.

Driven by legislation and environmental forces the worldwide use of lead-free solder pastes is increasing.

15.2 Through-hole mount packages

15.2.1 Soldering by dipping or by solder wave

Typical dwell time of the leads in the wave ranges from 3 seconds to 4 seconds at 250 °C or 265 °C, depending on solder material applied, SnPb or Pb-free respectively.

The total contact time of successive solder waves must not exceed 5 seconds.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified maximum storage temperature ($T_{stg(max)}$). If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

15.2.2 Manual soldering

Apply the soldering iron (24 V or less) to the lead(s) of the package, either below the seating plane or not more than 2 mm above it. If the temperature of the soldering iron bit is less than 300 °C it may remain in contact for up to 10 seconds. If the bit temperature is between 300 °C and 400 °C, contact may be up to 5 seconds.

15.3 Surface mount packages

15.3.1 Reflow soldering

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, convection or convection/infrared heating in a conveyor type oven. Throughput times (preheating, soldering and cooling) vary between 100 seconds and 200 seconds depending on heating method.

Typical reflow peak temperatures range from 215 °C to 270 °C depending on solder paste material. The top-surface temperature of the packages should preferably be kept:

- below 225 °C (SnPb process) or below 245 °C (Pb-free process)
  - for all BGA, HTSSON..T and SSOP..T packages
  - for packages with a thickness ≥ 2.5 mm
  - for packages with a thickness < 2.5 mm and a volume ≥ 350 mm^3 so called thick/large packages.
- below 240 °C (SnPb process) or below 260 °C (Pb-free process) for packages with a thickness < 2.5 mm and a volume < 350 mm^3 so called small/thin packages.

Moisture sensitivity precautions, as indicated on packing, must be respected at all times.

15.3.2 Wave soldering

Conventional single wave soldering is not recommended for surface mount devices (SMDs) or printed-circuit boards with a high component density, as solder bridging and non-wetting can present major problems.

To overcome these problems the double-wave soldering method was specifically developed.

If wave soldering is used the following conditions must be observed for optimal results:

- Use a double-wave soldering method comprising a turbulent wave with high upward pressure followed by a smooth laminar wave.
- For packages with leads on two sides and a pitch (e):
  - larger than or equal to 1.27 mm, the footprint longitudinal axis is **preferred** to be parallel to the transport direction of the printed-circuit board;
  - smaller than 1.27 mm, the footprint longitudinal axis **must** be parallel to the transport direction of the printed-circuit board.

  The footprint must incorporate solder thieves at the downstream end.
- For packages with leads on four sides, the footprint must be placed at a 45° angle to the transport direction of the printed-circuit board. The footprint 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.

Typical dwell time of the leads in the wave ranges from 3 seconds to 4 seconds at 250 °C or 265 °C, depending on solder material applied, SnPb or Pb-free respectively.

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

15.3.3 Manual soldering

Fix the component by first soldering two diagonally-opposite end leads. Use a low voltage (24 V or less) soldering iron applied to the flat part of the lead. Contact time must be limited to 10 seconds at up to 300 °C.

When using a dedicated tool, all other leads can be soldered in one operation within 2 seconds to 5 seconds between 270 °C and 320 °C.

15.4 Package related soldering information

Table 9: Suitability of IC packages for wave, reflow and dipping soldering methods

Mounting	Package [1]	Soldering method		
		Wave	Reflow [2]	Dipping
Through-hole mount	CPGA, HCPGA	suitable	–	–
	DBS, DIP, HDIP, RDBS, SDIP, SIL	suitable [3]	–	suitable
Through-hole-surface mount	PMFP [4]	not suitable	not suitable	–
Surface mount	BGA, HTSSON..T [5], LBGA, LFBGA, SQFP, SSOP..T [5], TFBGA, VFBGA, XSON	not suitable	suitable	–
	DHVQFN, HBCC, HBGA, HLQFP, HSO, HSOP, HSQFP, HSSON, HTQFP, HTSSOP, HVQFN, HVSON, SMS	not suitable [6]	suitable	–
	PLCC [7], SO, SOJ	suitable	suitable	–
	LQFP, QFP, TQFP	not recommended [7] [8]	suitable	–
	SSOP, TSSOP, VSO, VSSOP	not recommended [9]	suitable	–
	CWQCCN..L [10], WQCCN..L [10]	not suitable	not suitable	–

[1] For more detailed information on the BGA packages refer to the *(LF)BGA Application Note* (AN01026); order a copy from your Philips Semiconductors sales office.

[2] All surface mount (SMD) packages are moisture sensitive. Depending upon the moisture content, the maximum temperature (with respect to time) and body size of the package, there is a risk that internal or external package cracks may occur due to vaporization of the moisture in them (the so called popcorn effect). For details, refer to the Drypack information in the *Data Handbook IC26; Integrated Circuit Packages; Section: Packing Methods*.

[3] For SDIP packages, the longitudinal axis must be parallel to the transport direction of the printed-circuit board.

[4] Hot bar soldering or manual soldering is suitable for PMFP packages.

[5] These transparent plastic packages are extremely sensitive to reflow soldering conditions and must on no account be processed through more than one soldering cycle or subjected to infrared reflow soldering with peak temperature exceeding 217 °C ± 10 °C measured in the atmosphere of the reflow oven. The package body peak temperature must be kept as low as possible.

[6] These packages are not suitable for wave soldering. On versions with the heatsink on the bottom side, the solder cannot penetrate between the printed-circuit board and the heatsink. On versions with the heatsink on the top side, the solder might be deposited on the heatsink surface.

[7] If wave soldering is considered, then the package must be placed at a 45° angle to the solder wave direction. The package footprint must incorporate solder thieves downstream and at the side corners.

[8] Wave soldering is suitable for LQFP, QFP and TQFP packages with a pitch (e) larger than 0.8 mm; it is definitely not suitable for packages with a pitch (e) equal to or smaller than 0.65 mm.

[9] Wave soldering is suitable for SSOP, TSSOP, VSO and VSSOP packages with a pitch (e) equal to or larger than 0.65 mm; it is definitely not suitable for packages with a pitch (e) equal to or smaller than 0.5 mm.

[10] Image sensor packages in principle should not be soldered. They are mounted in sockets or delivered pre-mounted on flex foil. However, the image sensor package can be mounted by the client on a flex foil by using a hot bar soldering process. The appropriate soldering profile can be provided on request.

16. Revision history

Table 10: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
TDA8601_3	20040923	Product data sheet	-	9397 750 13713	TDA8601_2
Modifications:	• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors • Section 5: Ordering information adapted to present TDA8601/C2 and TDA8601T/C2 types • Section 7: Pin configuration drawings updated to current standard • Section 9: Changed V_P maximum value to +9 V • Section 11: Various values are updated to match TDA8601/C2 and TDA8601T/C2 • Figure 4, 5 and 6: Measurement level changed to 1.2 V				
TDA8601_2	19960627	Product specification	-	9397 750 00932	TDA8601_1
TDA8601_1	19940731	Product specification	-	9397 736 40011	-

17. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

18. Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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 — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

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21. Contact information

For additional information, please visit: **http://www.semiconductors.philips.com**

For sales office addresses, send an email to: **sales.addresses@www.semiconductors.philips.com**

22. Contents

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