

Horizontal combination

TDA2595

GENERAL DESCRIPTION

The TDA2595 is a monolithic integrated circuit intended for use in colour television receivers.

FEATURES

- Positive video input, capacitively coupled (source impedance < 200 Ω)
- Adaptive sync separator; slicing level at 50% of sync amplitude
- Internal vertical pulse separator with double slope integrator
- Output stage for vertical sync pulse or composite sync depending on the load, both are switched off at muting

- ϕ_1 phase control between horizontal sync and oscillator
- Coincidence detector ϕ_3 for automatic time-constant switching; overruled by the VCR switch
- Time-constant switch between two external time-constants or loop-gain; both controlled by the coincidence detector ϕ_3
- ϕ_1 gating pulse controlled by coincidence detector ϕ_3
- Mute circuit depending on TV transmitter identification
- ϕ_2 phase control between line flyback and oscillator; the slicing levels for ϕ_2 control and horizontal blanking can be set separately
- Burst keying and horizontal blanking pulse generation, in combination with clamping of the vertical blanking pulse (three-level sandcastle)
- Horizontal drive output with constant duty cycle inhibited by the protection circuit or the supply voltage sensor
- Detector for too low supply voltage
- Protection circuit for switching off the horizontal drive output continuously if the input voltage is below 4V or higher than 8V
- Line flyback control causing the horizontal blanking level at the sandcastle output continuously in case of a missing flyback pulse
- Spot-suppressor controlled by the line flyback control

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
$V_{15-5} = V_P$	Supply voltage (Pin 15)		12		12V
$V_{i(p-p)}$	Sync pulse amplitude (positive video)	50			50mV
I_4	Horizontal output current	50			50mA

PACKAGE OUTLINE

18-lead DIL; plastic (SOT102)

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RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage (Pin 15)	$V_{15-5} = V_P$	MAX.	13.2 V
Voltages at:			
Pins 1, 4 and 7	$V_{1;4;7-5}$	MAX.	18 V
Pins 8, 13 and 18	$V_{8;13;18-5}$	MAX.	V_P V
Pin 11 (range)	V_{11-5}	-0.5 to +6	V
Currents at:			
Pin 1	I_1	MAX.	10 mA
Pin 2 (peak value)	$\pm I_{2M}$	MAX.	10 mA
Pin 4	I_4	MAX.	100 mA
Pin 6 (peak value)	$\pm I_{6M}$	MAX.	6 mA
Pin 7	I_7	MAX.	10 mA
Pin 8 (range)	I_8	-5 to +1	mA
Pin 9 (range)	I_9	-10 to +3	mA
Pin 18	$\pm I_{18}$	MAX.	10 mA
Total power dissipation	P_{tot}	MAX.	800 mW
Storage temperature range	T_{stg}	-25 to +125	°C
Operating ambient temperature range	T_{amb}	0 to +70	°C

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CHARACTERISTICS $V_P = 12V$; $T_{amb} = +25^\circ C$; measured in Figure 1; unless otherwise specified

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Composite video input and sync separator (pin 11)					
$V_{11-5(p-p)}$	Input signal (positive video; standard signal; peak-to-peak value)	0.2	1	3	V
$V_{11-5(p-p)}$	Sync pulse amplitude (independent of video content)	50	—	—	mV
R_G	Generator resistance	—	—	200	Ω
I_{11} $-I_{11}$ $-I_{11}$	Input current during:				
	video	—	5	—	μA
	sync pulse	—	40	—	μA
$-I_{11}$	black level	—	25	—	μA
Composite sync generation (pin 10) horizontal slicing level at 50% of the sync pulse amplitude for $V_{11-5(p-p)} < 1.5V$					
I_{10} $-I_{10}$	Capacitor current during:				
	video	—	16	—	μA
$-I_{10}$	sync pulse	—	170	—	μA
Vertical sync pulse generation slicing level at 30% (60% between black level and horizontal slicing level); pin 9					
V_{9-5}	Output voltage	10	—	—	V
t_p	Pulse duration	—	190	—	μs
t_d	Delay with respect to the vertical sync pulse (leading edge)	—	45	—	μs
	Pulse-mode control	no current applied at pin 9			
	output current for vertical sync pulse (dual integrated)	current applied via a resistor of 15k Ω from V_P to pin 9			
	output current for horizontal and vertical sync pulse (non-integrated separated signal)				
Horizontal oscillator (pins 14 and 16)					
f_{osc}	Frequency; free running	—	15625	—	Hz
V_{14-5}	Reference voltage for f_{osc}	—	6	—	V
$\Delta f_{osc}/\Delta I_{14}$	Frequency control sensitivity	—	31	—	Hz/ μA
Δf_{osc}	Adjustment range of circuit Figure 1	—	± 10	—	%
Δf_{osc}	Spread of frequency	—	—	5	%
$\frac{\Delta f_{osc}/f_{osc}}{\Delta V_{15-5}/V_{15-5}}$ Δf_{osc} TC	Frequency dependency (excluding tolerance of external components)				
	with supply voltage ($V_P = 12V$)	—	± 0.05	—	
	with supply voltage drop of 5V	—	—	10	%
	with temperature	—	—	$\pm 10^{-4}$	K^{-1}
$+I_{16}$ $-I_{16}$	Capacitor current during:				
	discharging	—	1024	—	μA
$-I_{16}$	charging	—	313	—	μA
t_r t_f	Sawtooth voltage timing (pin 14)				
	rise time	—	49	—	μs
	fall time	—	15	—	μs

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SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Horizontal output pulse (pin 4)					
V_{4-5}	Output voltage LOW at $I_4 = 50mA$	—	—	0.5	V
t_p	Pulse duration (HIGH)	—	29 ± 15	—	μs
V_P	Supply voltage for switching off the output pulse (pin 15)	—	4	—	V
ΔV_P	Hysteresis for switching on the output pulse	—	250	—	mV
Phase comparison ϕ_1 (pin 17)					
V_{17-5}	Control voltage range	3.55	—	8.3	V
I_{17}	Leakage current at $V_{17-5} = 3.55$ to $8.3V$	—	—	1	μA
$\pm I_{17}$	Control current for external time-constant switch	1.8	2	2.2	mA
$\pm I_{17}$	Control current at $V_{18-5} = V_{15-5}$ and $V_{13-5} < 2$ or $V_{13-5} > 9.5V$	—	8	—	mA
$\pm I_{17}$	Control current at $V_{18-5} = V_{15-5}$ and $V_{13-5} = 2$ to $9.5V$	1.8	2	2.2	mA
S_ϕ	Horizontal oscillator control control sensitivity	6	—	—	kHz/ μs
$\pm \Delta f_{OSC}$	catching and holding range	—	680	—	Hz
$\pm \Delta f_{OSC}$	spread of catching and holding range	—	10	—	%
t_p	Internal keying pulse at $V_{13-5} = 2.9$ to $9.5V$	—	7.5	—	μs
	Time-constant switch				
V_{13-5}	slow time-constant at	9.5	—	2	V
V_{13-5}	fast time-constant at	2	—	9.5	V
$\pm V_{17-18}$	Impedance converter offset voltage (slow time-constant)	—	—	3	mV
R_{18-5}	Output resistance slow time-constant	—	—	10	Ω
R_{18-5}	fast time-constant	high impedance			
I_{18}	Leakage current	—	—	1	μA
Coincidence detector ϕ_3 (pin 13)					
V_{13-5}	Output voltage without coincidence with composite video signal	—	—	1	V
V_{13-5}	without coincidence without composite video signal (noise)	—	—	2	V
V_{13-5}	with coincidence with composite video signal	—	6	—	V
I_{13}	Output current without coincidence with composite video signal	—	50	—	μA
$-I_{13}$	with coincidence with composite video signal	—	300	—	μA
I_{13}	Switching current at $V_{13-5} = V_P - 0.5V$	—	—	100	μA
$I_{13(av)}$	at $V_{13-5} = 0.5V$ (average value)	—	—	100	μA

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SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Phase comparison ϕ_2 (pins 2 and 3) — SEE NOTE 1					
Input for line flyback pulse (pin 2)					
V_{2-5}	Switching level for ϕ_2 comparison and flyback control	—	3	—	V
V_{2-5}	Switching level for horizontal blanking	—	0.3	—	V
V_{2-5}	Input voltage limiting	—	-0.7	—	V
		—	+4.5	—	V
I_2	Switching current	0.01	1	—	mA
	at horizontal flyback				
I_2	at horizontal scan	—	—	2	μA
$-I_2$	Maximum negative input current	—	—	500	μA
Phase detector output (pin 3)					
$\pm I_3$	Control current for ϕ_2	—	1	—	mA
Δt_{ϕ_2}	Control range	—	19	—	μs
$\Delta t / \Delta t_d$	Static control error	—	—	0.2	%
I_3	Leakage current	—	—	5	μA
Δt	Phase relation between middle of the horizontal sync pulse and the middle of the line flyback pulse at $t_{fp} = 12\mu s$ (NOTE 2)	—	2.6 ± 0.7	—	μs
$\Delta I / \Delta t$	If additional adjustment is required, it can be arranged by applying a current at pin 3	—	30	—	$\mu A / \mu s$
Burst gating pulse (pin 6) (NOTE 3)					
V_{6-5}	Output voltage	10	11	—	V
t_p	Pulse duration	3.7	4	4.3	μs
t_{ϕ_6}	Phase relation between middle of sync pulse at the input and the leading edge of the burst gating pulse at $V_{6-5} = 7V$	2.15	2.65	3.15	μs
I_6	Output trailing edge current	—	2	—	mA
Horizontal blanking pulse (pin 6) (NOTE 3)					
V_{6-5}	Output voltage	4.1	4.5	4.9	V
I_6	Output trailing edge current	—	2	—	mA
V_{6-5sat}	Saturation voltage at horizontal scan	—	—	0.5	V
Clamping circuit for vertical blanking pulse (pin 6) (NOTE 3)					
V_{6-5}	Output voltage at $I_6 = 2.8mA$	2.15	2.5	3	V
I_{6min}	Minimum output current at $V_{6-5} > 2.15V$	—	2.3	—	mA
I_{6max}	Maximum output current at $V_{6-5} < 3V$	—	3.3	—	mA
TV-transmitter identification (pin 12) (NOTE 4)					
V_{12-5}	Output voltage	—	—	1	V
	no TV transmitter				
V_{12-5}	TV transmitter identified	7	—	—	V

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SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Mute output (pin 7)					
V_{7-5}	Output voltage at $I_7 = 3mA$; no TV transmitter	—	—	0.5	V
R_{7-5}	Output resistance at $I_7 = 3mA$; no TV transmitter	—	—	100	Ω
I_7	Output leakage current at $V_{12-5} > 3V$; TV transmitter identified	—	—	5	μA
Protection circuit (beam-current/EHT voltage protection) (pin 8)					
V_{8-5}	No-load voltage for $I_8 = 0$ (operative condition)	—	6	—	V
V_{8-5}	Threshold at positive-going voltage	—	8 ± 0.8	—	V
V_{8-5}	Threshold at negative-going voltage	—	4 ± 0.4	—	V
$\pm I_8$	Current limiting for $V_{8-5} = 1$ to 8.5V	—	60	—	μA
R_{8-5}	Input resistance for $V_{8-5} > 8.5V$	—	3	—	$k\Omega$
t_d	Internal response delay of threshold switch	—	10	—	μs
Control output of line flyback pulse control (pin 1)					
V_{1-5sat}	Saturation voltage at standard operation; $I_1 = 3mA$	—	—	0.5	V
I_1	Output leakage current in case of disturbance of line flyback pulse	—	—	5	μA

NOTES TO THE CHARACTERISTICS:

1. Phase comparison between horizontal oscillator and the line flyback pulse. Generation of a phase modulated (ϕ_2) horizontal output pulse with constant duration.
2. t_{fp} is the line flyback pulse duration.
3. Three-level sandcastle pulse.
4. If pin 12 is connected to V_P the vertical output is active independent of synchronization state.