PAL CHROMINANCE SIGNAL PROCESSOR FOR VIDEO RECORDERS

GENERAL DESCRIPTION

The TDA3760 is a monolithic integrated circuit for chrominance signal processing in video recorders.

Features

- Automatic gain controlled pre-amplifier with record/playback selection
- Signal mixer with balancing stage
- Output stage for the 627 kHz chrominance signal, with facility for being disabled by colour killer and record/playback mode switch
- Amplitude detector with automatic gain control for the preamplifier
- 4,43 MHz voltage controlled oscillator (VCO) for recording and playback
- 4,43 MHz fixed oscillator for playback
- Phase detector controlled synchronization of the VCO
- Subcarrier mixer
- H/2 demodulator for the production of PAL identification and colour killing signals
- Flip-flop for PAL identification
- Sandcastle pulse processing
- Colour killing stage with hysteresis
- Internal record/playback selection
- Second phase detector for fast phase correction of sub-carrier

QUICK REFERENCE DATA

Supply voltage (pin 9)	$V_P = V_{9\text{-}15}$	typ.	10 V
Supply current (pin 9)	$I_P = I_9$	typ.	45 mA
Inputs			
Chrominance signal			
4,43 MHz for record (peak-to-peak value)	$V_{2\text{-}15(p\text{-}p)}$	typ.	200 mV
627 kHz for playback (peak-to-peak value)	$V_{1\text{-}15(p\text{-}p)}$	typ.	200 mV
Outputs			
Chrominance signal			
4,43 MHz (peak-to-peak value)	$V_{24\text{-}15(p\text{-}p)}$	typ.	490 mV
627 kHz (peak-to-peak value)	$V_{26\text{-}15(p\text{-}p)}$	typ.	2 V

PACKAGE OUTLINE

28-lead DIL; plastic (SOT117).

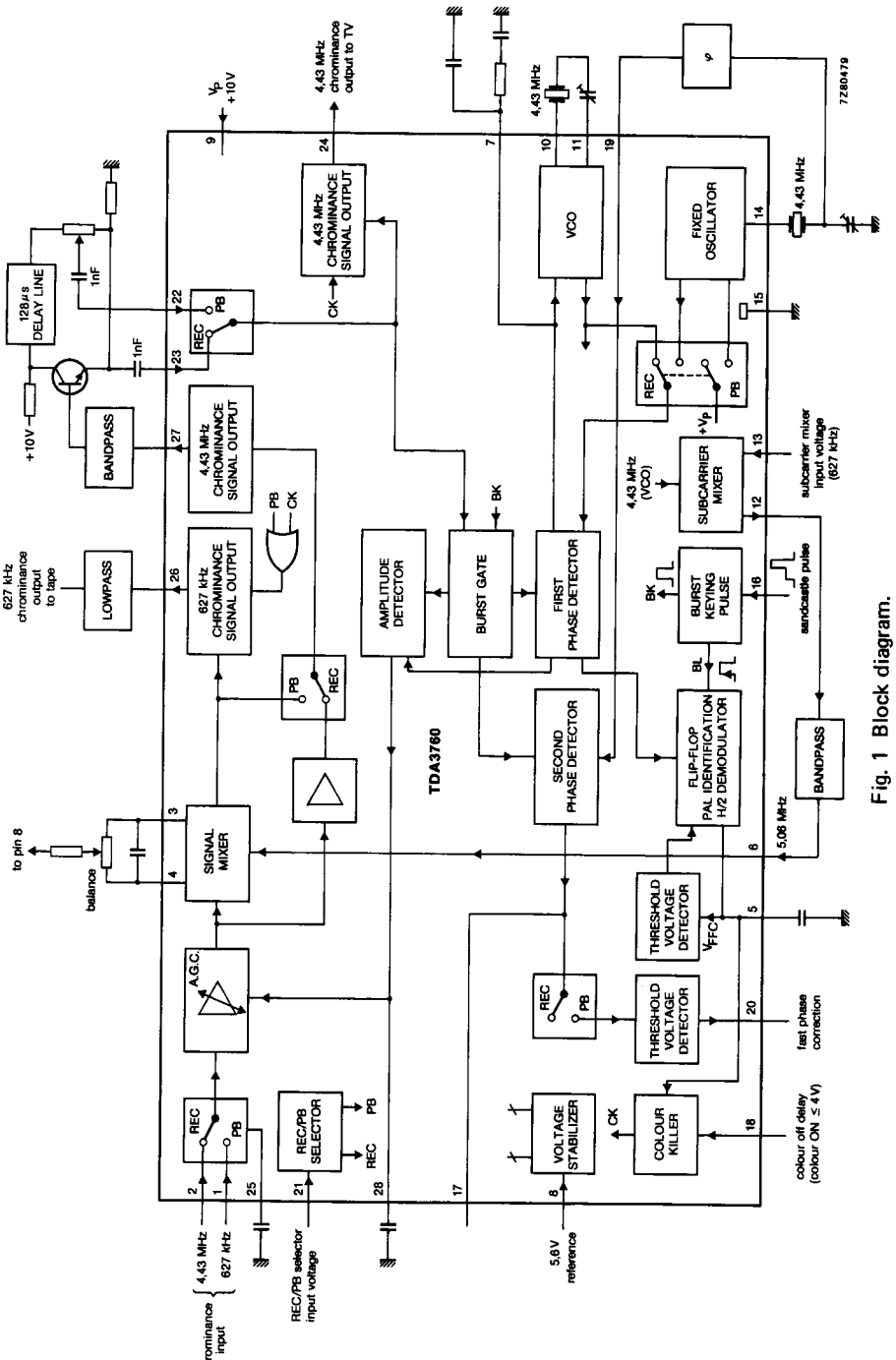

Fig. 1 Block diagram.

BK = burst key pulse
BL = blanking pulse
FFC = flip-flop correction
FPC = fast phase correction

REC = record
PB = playback
CK = colour killer

RATINGS

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

Supply voltage (pin 9)	$V_P = V_{9\text{-}15}$	max.	13,2	V
Voltage range at pins 1, 2, 5, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 23 to pin 15 (ground)	$V_{n\text{-}15}$		0 to V_P	V
Voltage ranges				
at pins 3, 4, 28*	$V_{3,\,4,\,28\text{-}15}$		3 to 6	V
at pin 6, 25*	$V_{6,\,25\text{-}15}$		0 to 5	V
at pin 10*	$V_{10\text{-}15}$		1,5 to 4	V
at pin 13*	$V_{13\text{-}15}$		0 to 3	V
at pin 14*	$V_{14\text{-}15}$		0 to 8	V
Voltages				
at pin 12	$V_{12\text{-}15}$	max.	V_P	V
at pin 24	$V_{24\text{-}15}$	max.	7	V
Currents				
at pins 11, 18	$-I_{11,\,18}$	max.	2	mA
at pins 12, 26, 27	$-I_{12,\,26,\,27}$	max.	5	mA
at pin 24	$-I_{24}$	max.	3	mA
Total power dissipation	P_{tot}	max.	1,4	W
Storage temperature range	T_{stg}		−25 to +150	°C
Operating ambient temperature range	T_{amb}		0 to +70	°C

* Measured with $V_{8\text{-}15} = 5{,}6$ V

CHARACTERISTICS

$V_P = V_{9-15} = 10$ V; $V_{8-15} = 5{,}6$ V; $T_{amb} = 25$ °C; burst key duration 4 μs; unless otherwise specified

parameter	symbol	min.	typ.	max.	unit
Supply (pin 9)					
Supply voltage	$V_P = V_{9-15}$	9,6	–	13,2	V
Supply current for playback and burst keying					
at $-I_{12, 18, 24, 26, 27} = 0$	$I_P = I_9$	–	45	–	mA
at $-I_{12, 18, 24, 26, 27} = 0$; $V_P = 12$ V	$I_P = I_9$	–	46	–	mA
A.G.C. preamplifier (pins 1 and 2)					
Input voltage* (f = 4,43 MHz) during record (peak-to-peak value)	$V_{2-15(p-p)}$	20	–	400	mV
Input voltage* (f = 627 kHz) during playback (peak-to-peak value)	$V_{1-15(p-p)}$	30	–	400	mV
Input resistance	$R_{1, 2-15}$	7	–	–	kΩ
Input capacitance	$C_{1, 2-15}$	–	–	5	pF
627 kHz chrominance signal (pin 26)* (transposed on to 627 kHz signal)					
Output voltage (peak-to-peak value)	$V_{26-15(p-p)}$	–	2	–	V
Signal suppression at output					
for f = 1,25 MHz	α_{26}	–	35	–	dB
for f = 5,06 MHz (externally balanced via pins 3 and 4)	α_{26}	–	40	–	dB
during colour killing (pin 25)	α_{26}	40	–	–	dB
D.C. output voltage	V_{26-15}	–	6,7	–	V
4,43 MHz chrominance signal (pin 27)*					
Output voltage					
during record (peak-to-peak value)	$V_{27-15(p-p)}$	–	1,15	–	V
during playback after signal mixing (peak-to-peak value)	$V_{27-15(p-p)}$	–	–	3,1	V
Signal suppression at output					
for f = 5,06 MHz (externally balanced)	α_{27}	–	40	–	dB
for f = 8,86 MHz	α_{27}	–	30	–	dB
for f = 3,81 MHz	α_{27}	–	38	–	dB
for f = 3,18 MHz	α_{27}	–	30	–	dB
D.C. output voltage	V_{27-15}	–	7	–	V

* The chrominance signal values hold for a 75% saturated colour bar signal.

parameter	signal	min.	typ.	max.	unit
4,43 MHz chrominance signal amplifier*					
Burst input signal					
at pin 22 (peak-to-peak value)	$V_{22\text{-}15(p\text{-}p)}$	–	225	–	mV
at pin 23 (peak-to-peak value)	$V_{23\text{-}15(p\text{-}p)}$	–	225	–	mV
Input resistance					
at pin 22	$R_{22\text{-}15}$	6	–	–	kΩ
at pin 23	$R_{23\text{-}15}$	6	–	–	kΩ
Output voltage of the chrominance signal at pin 24 (peak-to-peak value)	$V_{24\text{-}15(p\text{-}p)}$	–	490	–	mV
Signal suppression at output (pin 24) during colour killing	α_{24}	35	–	–	dB
D.C. output voltage					
during colour-on	$V_{24\text{-}15}$	–	2,4	–	V
during colour-off (killed)	$V_{24\text{-}15}$	–	0,7	–	V
Subcarrier mixer					
627 kHz input voltage; sine-wave (peak-to-peak value)	$V_{13\text{-}15(p\text{-}p)}$	220	–	–	mV
Input resistance	$R_{13\text{-}15}$	1	–	–	kΩ
D.C. output voltage	$V_{12\text{-}15}$	–	7,9	–	V
5,06 MHz output voltage selective** (peak-to-peak value)	$V_{12\text{-}15(p\text{-}p)}$	–	800	–	mV
Signal suppression at output**					
for f = 4,43 MHz	α_{12}	20	–	–	dB
for f = 5,68 MHz	α_{12}	30	–	–	dB
Subcarrier input					
5,06 MHz input voltage (peak-to-peak value)	$V_{6\text{-}15(p\text{-}p)}$	250	–	–	mV
Input resistance	$R_{6\text{-}15}$	1,9	–	–	kΩ
Input capacitance	$C_{6\text{-}15}$	–	–	5	pF

* Chrominance signal values hold for a 75% saturated colour bar signal.

** Measured with a 0,32 V (peak-to-peak), 627 kHz input signal on pin 13 ($-I_{12}$ = 1 mA).

CHARACTERISTICS (continued)

parameter	symbol	min.	typ.	max.	unit
4,43 MHz voltage controlled oscillator (VCO)					
Input resistance	$R_{10\text{-}15}$	–	430	–	Ω
Input capacitance	$C_{10\text{-}15}$	–	–	10	pF
Output resistance	$R_{11\text{-}15}$	–	–	200	Ω
PLL-controlled oscillator catching range	Δf	± 500	–	–	Hz
Phase difference between oscillator and burst signal for ± 400 Hz deviation of crystal frequency	φ	± 7	–	–	deg
4,43 MHz fixed oscillator					
Oscillator temperature coefficient*	TC	–	–	–3	Hz/K
Record/playback selector (pin 21)					
Input voltage for record**	$V_{21\text{-}15}$	–	–	4	V
Input current with $V_{21\text{-}15}$ = 4 V	I_{21}	–	–	130	μA
Input voltage for playback	$V_{21\text{-}15}$	8	–	–	V
Input current with $V_{21\text{-}15}$ = 8 V	I_{21}	–	–	430	μA
Input resistance	$R_{21\text{-}15}$	7	–	–	kΩ
Colour (on/off) killer delay					
Delay for chrominance signal OFF at ΔV = 1 V; C = 1 μF; PNP emitter follower with internal current of 0,1 mA	t_d	–	10	–	ms
Input voltage (pin 18)					
for forced colour ON	$V_{18\text{-}15}$	–	–	4	V
for forced colour OFF	$V_{18\text{-}15}$	5,5	–	9	V
Voltage stabilizer (pin 8)					
Range of external reference voltage	$V_{8\text{-}15}$	5,3	–	5,8	V
Input current	$-I_8$	–	–	120	μA

* Not considering the effects of external components.
** Pin open: record.

parameter	symbol	min.	typ.	max.	unit
Sandcastle pulse input (pin 16)					
Input voltage for burst keying	$V_{16\text{-}15}$	7,1	–	–	V
Input current	I_{16}	–	–	5	μA
Delay time of BK	t_d	–	0,55	–	μs
Input voltage for triggering of flip-flop	$V_{16\text{-}15}$	2	–	–	V
Fast phase correction					
Input voltage* (peak-to-peak value)	$V_{19\text{-}15(p\text{-}p)}$	200	–	400	mV
Input resistance	$R_{19\text{-}15}$	3,3	–	–	kΩ
Output voltage					
without correction					
below phase differences of ± 50° at $I_{20} < \pm 20\ \mu A$ and $V_{17\text{-}15} < 6{,}5$ V	$V_{20\text{-}15}$	–	–	5,2	V
with correction					
above phase differences of ± 65° at $I_{20} < \pm\ 20\ \mu A$ and $V_{17\text{-}15} > 7{,}1$ V	$V_{20\text{-}15}$	9	–	–	V
Output resistance	$R_{20\text{-}15}$	–	35	–	kΩ

* Phase difference between output pin 14 and input pin 19 should be $\varphi = 90°$.

APPLICATION INFORMATION

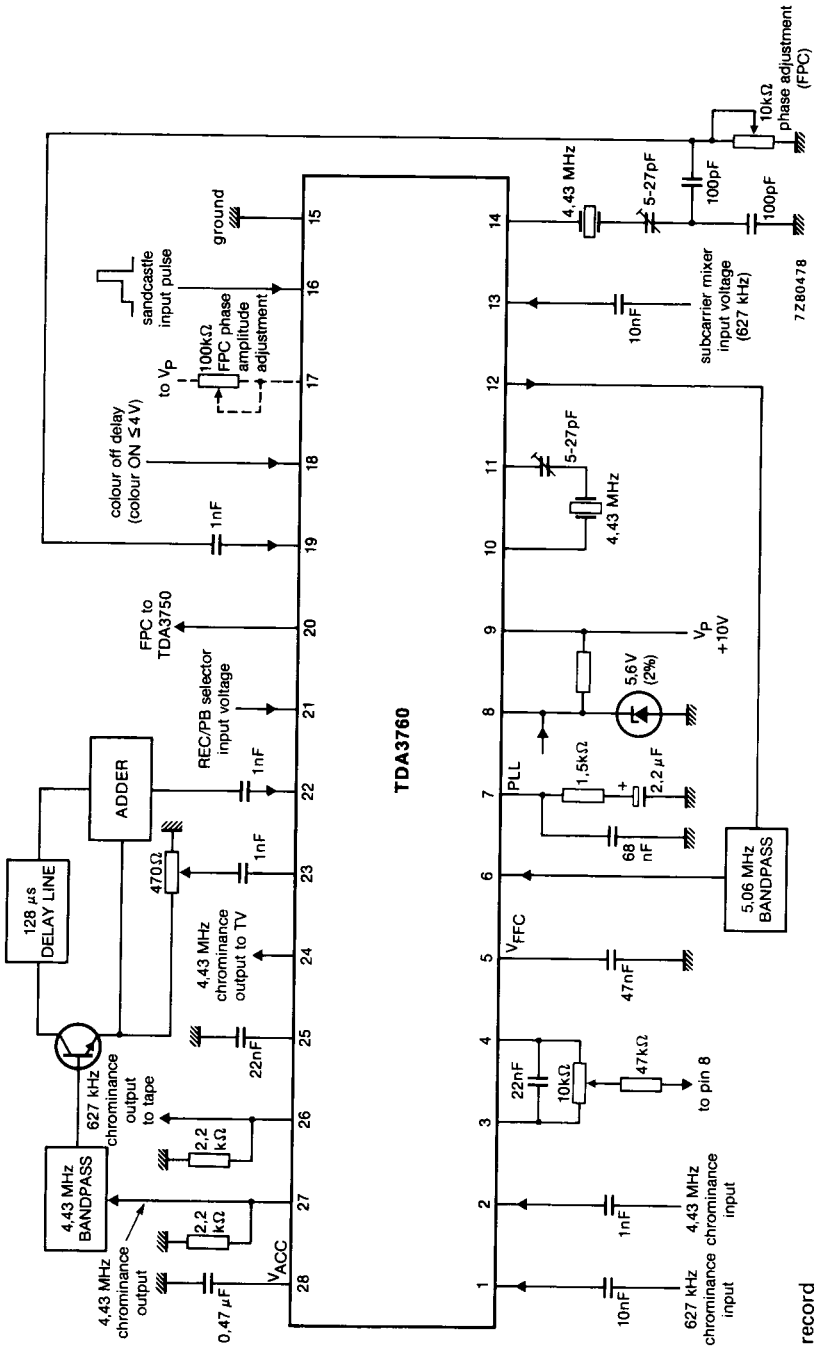

Fig. 2 Application diagram.

REC = record
PB = playback
FPC = fast phase correction
FFC = flip-flop correction