ILA8362ANS

Integrated PAL and PAL/NTSC TV processor

GENERAL DESCRIPTION

The ILA8362ANS is designed to be used in a multi-standard TV receiver and contains functional units for processing signals of intermediate frequency of audio and sound, vertical scanning and line synchronisation of colour signal in PAL/NTSC and RGB output signal.

The ILA8362ANS is pin to pin compatible with TDA8362A, Philips and nearly identical to the TDA8362. The main difference between ILA8362ANS and TDA8362 is that ILA8362ANS contain a black-current stabilisation circuit. Because of the required input pin for the black-current stabilisation circuit the luminance peaking function has been omitted in the ILA8362ANS. All other function of the 2 IC's are identical. The pinning of the 2 IC's is slightly different, because the ILA8362ANS have a ground connection on each side. This adoption of the pinning has positive effects on the application of the IC.

The ILA8362ANS is single-chip TV processors which contain nearly all small signal functions that are required for a colour television receiver. For a complete receiver the following circuits need to be added: a tuner, a SECAM decoder a base-band delay line (ILA4661) and output stages for audio, video and horizontal and vertical deflection.

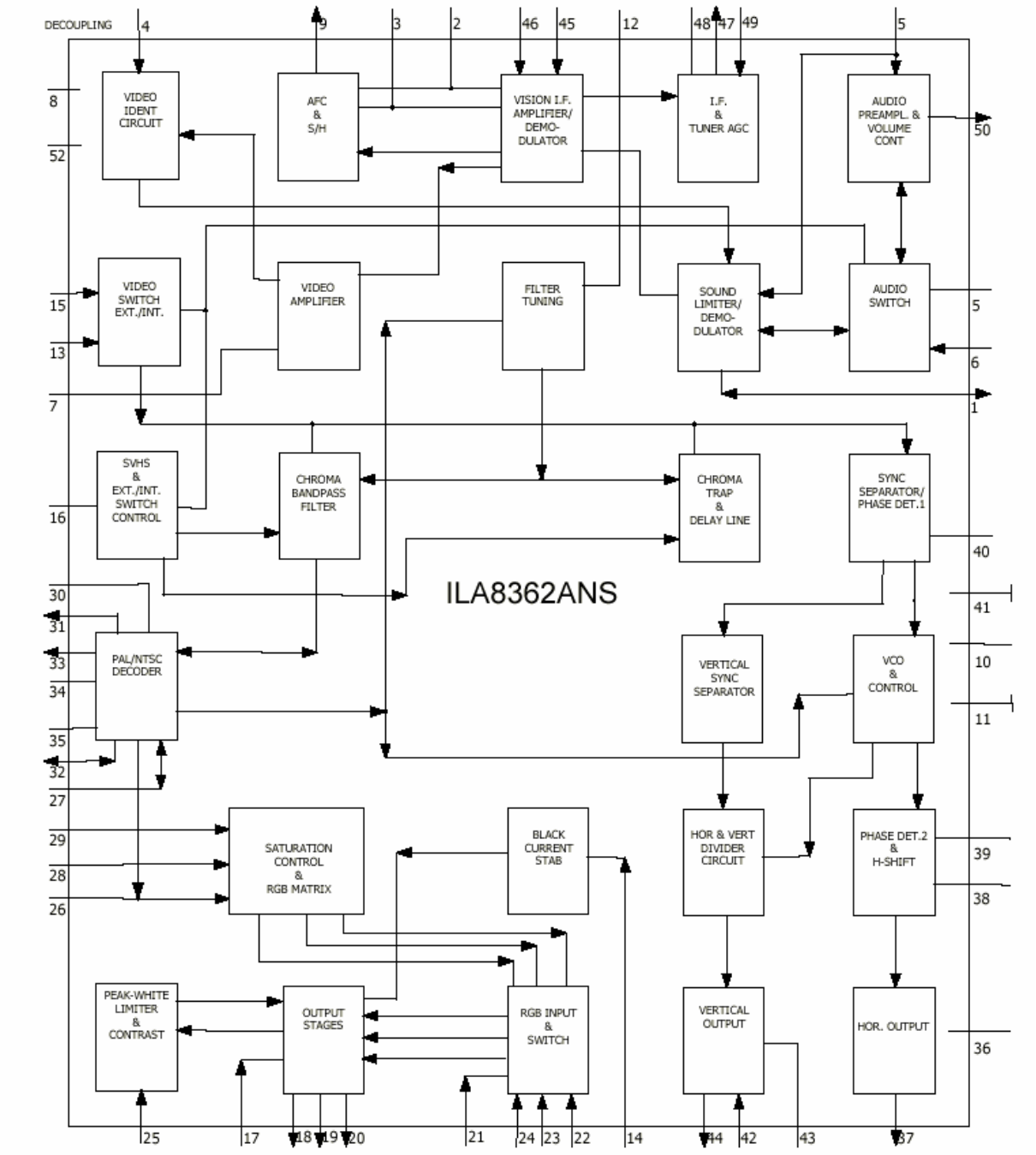
FEATURES

- Multistandard vision IF circuit (positive and negative modulation)
- Multistandard FM sound demodulator (4.5 Mhz to 6.5 Mhz)
- Source selection for external A/V inputs (separate Y/C signals can also be applied)
- Integrated chrominance trap and bandpass filters (automatically calibrated)
- Integrated luminance delay line
- PAL/NTSC colour decoder with automatic search system
- Easy interfacing with the ILA8395 (SECAM decoder) for multistandard applications.
- RGB control circuit with linear RGB inputs and fast blanking
- Input for automatic cut-off control with compensation for leakage current of the picture tube.
- Horizontal synchronisation with two control loops and alignment-free horizontal oscillator without external components
- Vertical count-down circuit (50/60 Hz) and vertical preamplifier
- Low dissipation (700 mW)
- Small amount of peripheral components compared with competition ICs
- Only one adjustment (vision IF demodulator)
- The ICs are mounted in a shrink DIL package with 52 pins

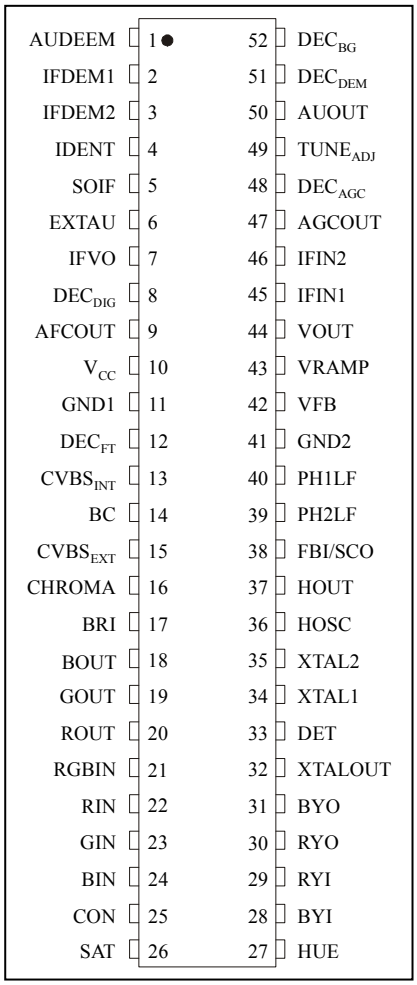
QUICK REFERENCE DATA

Parameter	Symbol	Min.	Max.
Supply voltage, V	V_P	7.2	8.8
Supply current, mA	I_P	30	120
Video IF amplifier sensitivity (RMS value), μV	Vi(rms)	–	100
Gain control rang, dB	Gcr	64	–
Bandwidth of demodulated output signal, MHz	B	6.0	–
Video non linearly, %	NLvid	–	5
Signal-to-noise ratio, dB	S/N	52	–
Minimum starting level voltage for tuner take-over (RMS value), mV	Vmin	0.15	0.5
Maximum starting level voltage for tuner take-over (RMS value), mV	Vmax	100	200
Output voltage swing AFC, V	V	5	–
AFC slope, mV/kHz	fsl	120	200
Output voltage: video not identified, V video identified; colour signal available; fosc=3.5МГц, V video identified; colour signal available/unavailable; fosc=4.4МГц, V	Vo	 – 5.5 7.1	 0.5 6.5 8.8
Catching range PLL, MHz	δf	4.2	6.8
Control range, dB	VOLcr	80	–
Suppression of output signal when mute is active, mV	OSS	80	–
Sync pulse amplitude, mV	V13	50	–
Free running frequency, Hz	ffr	15310	15940
Holding range PLL, kHz	fHR	–	±1.2
Catching range PLL, kHz	fCR	±0.6	–
Voltage to switch on the X-ray protection, V	V39	6.0	–
Locking range, Hz	flock	45	64.5
Locking range (lines/frame)	LF	488	722
Residual carrier output voltage (peak-to-peak value) (R-Y) and (B-Y) outputs, mV	V30	–	15
H/2 ripple at (R-Y) output (peak-to-peak value), mV	$V30_r$	–	25
Saturation control range, dB	CRs	52	–
Contrast control range, dB	CRc	18	24
Brightness control range, V	CRb	±0.6	±1.3
Output voltage level, V	Vo	2.8	5.2
Residual frequency at f_{OSC} in the RGB outputs (peak-to-peak value), mV Residual frequency at $2f_{OSC}$ plus higher harmonics in the RGB outputs (peak-to-peak value), mV	fres	 – –	 25 25
Difference in black level between the three outputs (nominal brightness), mV	Vdiff	–	50
Bandwidth of output signals for RGB input CVBS input (f_{OSC}=3.58 MHz) CVBS input (f_{OSC}=4.43 MHz) S-VHS input	B	 8 2.8 3.5 8	 – 3 4 –

BLOCK DIAGRAM



PIN DESCRIPTIONS



PIN	SYMBOL	DESCRIPTION
01	AUDEEM	audio de-emphasise and modulation switch
02	IFDEM1	IF demodulator tuned circuit
03	IFDEM2	IF demodulator tuned circuit
04	IDENT	video identification output/MUTE input
05	SOIF	sound IF input and volume control
06	EXTAU	external audio input
07	IFVO	IF video output
08	DECdig	decoupling digital supply
09	AFCOUT	AFC output
10	Vcc	supply voltage (+8 V)
11	GND1	ground 1
12	DECft	decoupling filter tuning
13	CVBSint	internal CVBS input
14	BC	black current input
15	CVBSext	external CVBS input
16	CHROMA	chrominance and A/V switch input
17	BRI	brightness control input
18	BOUT	blue output
19	GOUT	green output
20	ROUT	red output
21	RGBIN	RGB insertion and blanking input
22	RIN	red input
23	GIN	green input
24	BIN	blue input
25	CON	contrast control input
26	SAT	saturation control input
27	HUE	hue control input (or chrominance output)
28	BYI	B-Y input signal
29	RYI	R-Y input signal
30	RYO	R-Y output signal
31	BYO	B-Y output signal
32	XTALOUT	4.43 MHz output for ILA8395
33	DET	loop filter burst phase detector
34	XTAL1	3.58 MHz crystal connection
35	XTAL2	4.43 MHz crystal connection
36	HOSC	supply/start horizontal oscillator
37	HOUT	horizontal output
38	FBI/SCO	flyback input/sandcastle output
39	PH2LF	phase 2 loop filter
40	PH1LF	phase 1 loop filter
41	GND2	ground 2
42	VFB	vertical feedback input
43	VRAMP	vertical ramp generator
44	VOUT	vertical output
45	IFIN1	IF input 1
46	IFIN2	IF input 2
47	AGCOUT	tuner AGC output
48	DECagc	AGC decoupling capacitor
49	TUNEadj	tuner take-over adjustment
50	AUOUT	audio output
51	DECdem	decoupling sound demodulator
52	DECbg	decoupling bandgap supply

FUNCTIONAL DESCRIPTION

Video IF amplifier

The IF amplifier contains 3 AC-coupled control stages with a total gain control range of greater than 60 dB and sensitivity 70 μV.

The reference carrier for the video demodulator is obtained by means of passive regeneration of the picture carrier. The external reference tuned circuit is the only remaining adjustment of the IC.

The polarity of the demodulator can be switched so that the circuit is suitable for both positive and negative modulated signals.

The AFC circuit is driven with the same reference signal as the video demodulator. The AFC output voltage is 6 V.

The AGC detector operates on levels, top sync for negative modulated and top white for positive modulated signals. The AGC detector time constant capacitor is connected externally. This is mainly because of the flexibility of the application.

The time constant of the AGC system during positive modulation is slow, this is to avoid any visible picture variations. This, however, causes the system to react very slowly to sudden changes in the input signal amplitude.

To overcome this problem a speed-up circuit has been included which detects whether the AGC detector is activated every frame period.

The circuit contains a video identification circuit which is independent of the synchronisation circuit. Therefore search tuning is possible when the display section of the receiver is used as a monitor. In the normal television mode the identification output is connected to the coincidence detector, this applies to all three devices. The identification output voltage is LOW when no transmitter is identified. In this condition the sound demodulator is switched off (mute function). When a transmitter is identified the output voltage is HIGH. The voltage level is dependent on the frequency of the incoming chrominance signal.

Sound circuit

The sound bandpass and trap filters have to be connected externally. The filtered intercarrier signal is fed to a limiter circuit and is demodulated by means of a PLL demodulator. The PLL circuit tunes itself automatically to the incoming signal, consequently, no adjustment is required.

Synchronisation circuit

The sync separator is proceeded by a voltage controlled amplifier which adjusts the sync pulse amplitude to a fixed level. The sync pulses are then fed to the slicing stage (separator) which operates at 50% of the amplitude.

The separated sync pulses are fed to the first phase detector and to the coincidence detector. The coincidence detector is used for transmitter identification and to detect whether the line oscillator is synchronised.

The line oscillator operates at twice the line frequency.

The oscillator network is internal. Because of the spread of internal components an automatic adjustment circuit has been added to the IC. The circuit compares the oscillator frequency with that of the crystal oscillator in the colour decoder. This results in a free-running frequency which deviates less than 2% from the typical value.

The circuit employs a second control loop to generate the drive pulses for the horizontal driver stage.

X-ray protection can be realised by switching the pin of the second control loop to the positive supply line. The detection circuit must be connected externally. When the X-ray protection is active the horizontal output voltage is switched to a high level. When the voltage on this pin returns to its normal level the horizontal output is released again.

The IC contains a start-up circuit for the horizontal oscillator. When this feature is required a current of 5.5 mA has to be supplied to pin 36. For an application without start-up both supply pins (10 and 36) must be connected to the 8 V supply line.

The drive signal for the vertical ramp generator is generated by means of a divider circuit. The RC network for the ramp generator is external.

Integrated video filters

The circuit contains a chrominance bandpass and trap circuit. The filters are realised by means of gyrator circuits and are automatically tuned by comparing the tuning frequency with the crystal frequency of the decoder.

When the pin is left open-circuit the trap is switched off so that the circuit can also be used for S-VHS applications.

The luminance delay line and the delay for the peaking circuit are also realised by means of gyrator circuits.

Colour decoder

The colour decoder in the various ICs contains an alignment-free crystal oscillator, a colour killer circuit and colour difference demodulators. The 90° phase shift for the reference signal is achieved internally.

Demodulation and array/matrix mode is switched depending on input signal standard.

The circuit can co-operate with the SECAM add-on decoder ILA8395.

The communication between the two ICs is achieved via pin 32. The ILA8362ANS supplies the reference signal (4.43 MHz) for the calibration system of the ILA8395, identification of the colour standard is via the same connection.

RGB output circuit

The colour difference signals are matrixed with the luminance signal to obtain the RGB signals. The contrast and brightness controls operate on internal and external signals.

When applying to output 21 voltage of more then 4 V there may be possibility of immediate application of RGB-signals to RGB-outputs.

Outputs signal amplitude at nominal settings and input conditions is 2 V from white to black.

Presence of automatic stabilisation of black current enables to eliminate further settings of dark level during operation. This circuit is a backfeed loop, operates during four line periods, which precede the end of the blanking frame pulse and stabilises black current of each of RGB-channels in sequence and independently.

MAXIMUM RATINGS

Symbol	Parameter	Min	Max	Unit
Tstg	Storage temperature	-60	+150	°C
T_{amb}	Operating ambient temperature	-25	+70	°C
T_{sol}	Soldering temperature for 10 s	-	260	°C
T_j	Maximum junction temperature (operating)	-	150	°C

ELECTRICAL CHARACTERISTICS (V_{CC} = 8 V; Tamb = 25°C; unless otherwise specified)

Symbol	Parameter	Guaranteed Limits		Unit
		Min	Max	
Supplies				
V_{CC}	Supply voltage	7.2	8.8	V
I_P	Supply current	-	110	mA
I_{HOSC}	Horizontal oscillator start current	6.5	-	mA
V_{th}	Sweep threshold start	5.5	6.5	V
IF circuit				
$V_{ISION\ IF\ AMPLIFIER\ INPUTS}$				
$V_{i(rms)}$	Input sensitivity (RMS value)	-	100	μV
R_I	Input resistance (differential)	1.4	2.6	kΩ
C_I	Input capacitance (differential)	2.0	4.0	pF
G_{cr}	Gain control range	64	-	dB
θ	AGC efficiency (when changing input signal to 50 dB)	-	6	dB
$V_{IDEO\ AMPLIFIER\ OUTPUT}$				
V_{07}	Zero signal output level of video amplifier			V
	negative modulation	4.0	5.6	
	positive modulation	1.2	2.8	
V_{S7}	Top sync level of video amplifier			V

Symbol	Parameter		Guaranteed Limits		Unit
			Min	Max	
	negative modulation		1.9	2.1	
V_{W7}	White level of video amplifier positive modulation		 4.0	 4.5	V
ΔV_7	Difference in amplitude between negative and positive modulation		-	25	%
Z_O	Video output impedance		-	50	Ω
B	Bandwidth of demodulated output signal		6	-	MHz
G_{diff}	Gain differential		-	5	%
F_{diff}	Phase differential		-	5	deg
NL_{vid}	Video non linearity		-	5	%
V_{th}	White spot threshold voltage level		4.0	5.6	V
V_{ins}	White spot insertion voltage level		2.9	4.5	V
N_{clamp}	Noise inverter clamping voltage level		0.7	1.6	V
η	Intermodulation blue yellow blue yellow	 V_O = 0.92 or 1.1 Mhz V_O = 0.92 or 1.1 Mhz V_O = 2.66 or 3.3 Mhz V_O = 2.66 or 3.3 Mhz	 60 56 60 60	 - - - -	 dB dB dB dB
S/N	signal-to-noise ratio Vi = 10 mV		52	-	dB
V_n	Residual carrier signal		-	7	mV
V_{2n}	Residual 2nd harmonic of carrier signal		-	3.5	mV
IF AND TUNER AGC					
Timing of IF-AGC					
γ	Modulated video interference		-	10	%
t_{inc}	Response time for an IF input signal amplitude increase of 52 dB for positive and negative modulation		1	3	ms
t_{dec}	Response time for an IF input signal amplitude decrease of 52 dB for negative modulation for positive modulation		 15 60	 35 140	 ms ms
I_{leak}	Allowed leakage current of the AGC capacitor for negative modulation for positive modulation		 - -	 10 200	 µA nA
Tuner take-over adjustment					
V_{min}	Minimum starting level voltage for tuner take-over (RMS value)		0.15	0.5	mV
V_{max}	Maximum starting level voltage for tuner take-over (RMS value)		100	200	mV
V_{cr}	Control voltage range		0.5	4.5	V
Tuner control output					
$V_{(sat)}$	Output saturation voltage		-	300	mV
I_{leak}	Leakage current RF AGC		-	1	µA
ΔV_{47}	Input signal variation for complete tuner control		0.5	4	dB

Symbol	Parameter		Guaranteed Limits		Unit
			Min	Max	
AFC OUTPUT					
V	Output voltage swing		5	-	V
f_{sl}	AFC slope		120	200	kHz
f_{os}	AFC offset		-	50	kHz
V_O	Output voltage at centre frequency		3.5	4.5	V
Z_O	Output impedance		30	70	kΩ
SWITCHING TO POSITIVE MODULATION					
I_I	Input current on pin 1 to switch the video demodulator and AGC to positive modulation		50	150	μA
VIDEO IDENTIFICATION OUTPUT					
V_O	Output voltage	Video not identified	-	0.5	V
Z_O	Output impedance		14	26	kΩ
V_O	Output voltage	Video identified; colour signal available; fOSC = 3.5 MHz	5.5	6.5	V
		Video identified; colour signal available; fOSC = 4.4 MHz	7.1	8.8	V
t_d	Delay time of identification after the AGC has stabilised on a new transmitter		-	10	ms
Sound circuit					
DEMODULATOR INPUT					
Δf	Catching range PLL		4.2	6.8	MHz
R_I	DC input resistance		6	10	kΩ
C_I	Input capacitance		-	5	pF
AMR	AMR rejection		66	-	dB
DE-EMPHASIS					
$V_{O(rms)}$	Output signal amplitude (RMS value)		200	400	mV
R_O	Output resistance		10	20	kΩ
V_1	DC output voltage		2.6	3.4	V
AUDIO ATTENUATOR OUTPUT					
$V_{O(rms)}$	Output signal amplitude (RMS value)		500	900	mV
R_O	Output resistance		175	325	Ω
V_{50}	DC output voltage		2.9	3.7	V
THD	Total harmonic distortion		-	0.5	%
S/N	Internal signal-to-noise ratio		60	-	dB
VOL_{cr}	Control range		80	-	dB
OSS	Suppression of output signal when mute is active		80	-	dB
ΔV_{50}	DC shift of the output when mute is active		-	50	mV
EXTERNAL AUDIO INPUT					
R_I	Input resistance		17.5	32.5	kΩ
ΔG_V	Voltage gain difference between input and output		8	14	dB

Symbol	Parameter		Guaranteed Limits		Unit
			Min	Max	
α	Crosstalk between internal and external audio signals		60	-	dB
CVBS/On-Screen Display and CD inputs					
INTERNAL AND EXTERNAL CVBS INPUTS					
I_{13}	Internal CVBS input current		-	5.2	µA
I_{15}	External CVBS input current		-	5.2	µA
ISS	Suppression of non-selected CVBS input signal		50	-	dB
COMBINED CHROMINANCE AND SWITCH INPUT					
V_{16}	Chrominance input voltage (peak-to-peak value)		0.16	0.4	V
R_I	Chrominance input resistance		10.5	19.5	kΩ
C_i	Chrominance input capacitance		-	5	pF
V_{16}	DC input voltage to switch the A/V switch to external mode		-	0.5	V
V_{16}	DC input voltage for chrominance insertion		3	5	V
SS	Suppression of non-selected chrominance signal from CVBS input		50	-	dB
RGB INPUTS FOR ON-SCREEN DISPLAY					
V_I	Input signal amplitude for an output signal of 4V (black-to-while) (peak-to-peak value)		-	1.0	V
V_{diff}	Difference of black level of internal and external signals at the outputs		-	100	mV
I_I	Input currents		-	0.13	µA
FAST BLANKING					
V_I	Fast blanking input voltage	No data insertion	-	0.3	V
		Data insertion	0.9	-	V
$V_{I(max)}$	Maximum input pulse		-	3	V
t_d	Delay of data insertion		-	20	ns
I_{21}	Input current		-	0.2	mA
SS_{int}	Suppression of internal RGB signals with data insertion at f = 0 to 5 MHz		46	-	dB
SS_{ext}	Suppression of external RGB signals with data insertion at f = 0 to 5 MHz		46	-	dB
V_I	Input voltage to blank the RGB outputs to facilitate ON-Screen-Display signals being applied to these outputs		4	-	V
t_d	Delay between the input pulse and the blanking at the output		21	39	ns
COLOUR DIFFERENCE INPUT SIGNALS					
V_{29}	Input signal amplitude (R-Y) (peak-to-peak value)		-	1.4	V
$V_{28)}$	Input signal amplitude (B-Y) (peak-to-peak value)		-	1.85	V
I_I	Input current for both inputs		-	1.0	µA
Chrominance filters					
CHROMINANCE TRAP CIRCUIT					
f_{trap}	Trap frequency		f0-0.5	f0+0.5	MHz
QFtr	Trap quality factor		1.8	2.2	

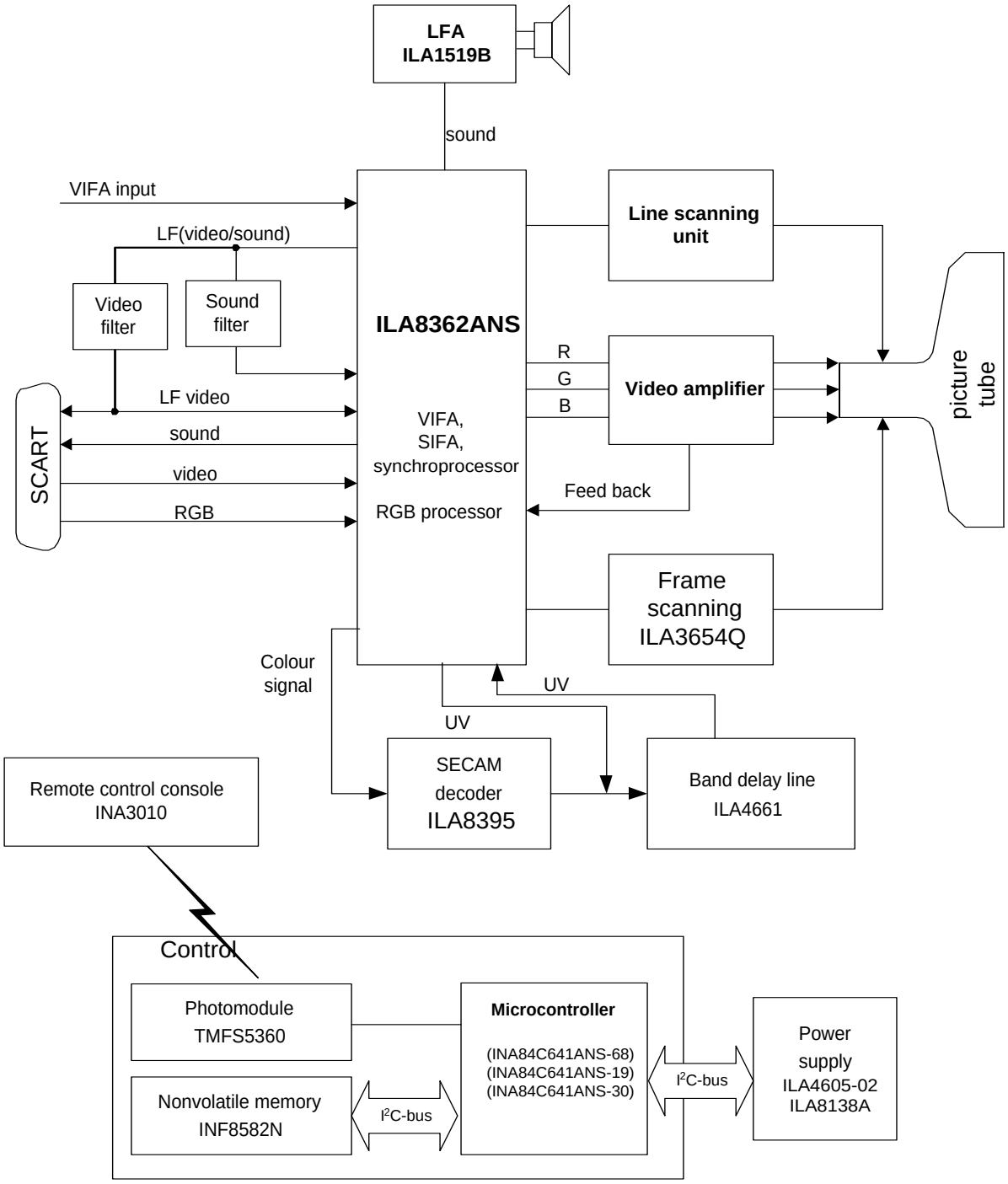
Symbol	Parameter	Guaranteed Limits		Unit
		Min	Max	
SR	Colour subcarrier rejection	20	-	dB
CHROMINANCE BANDPASS CIRCUIT				
f_C	Centre frequency	f0-0.5	f0+0.5	MHz
QFbp	Bandpass quality factor	2.5	3.5	
Delay line peaking circuit				
Y DELAY LINE				
t_d	Delay time	450	510	ns
B	Bandwidth of internal delay line	8	-	MHz
Horizontal and vertical synchronisation circuits				
SYNC VIDEO INPUT				
V_{13}	Sync pulse amplitude	50	-	mV
SL	Slicing level	35	65	%
SYNC VIDEO INPUT				
t_W	Width of the vertical sync pulse without sync instability	22	-	µs
HORIZONTAL OSCILLATOR				
f_{fr}	Free running frequency	15310	15940	Hz
$\Delta f/\Delta V$	Frequency variation with respect to the supply voltage	-	0.5	%
$\Delta f_{(max)}$	Maximum frequency deviation at the start of the horizontal output	-	75	%
FIRST CONTROL LOOP				
f_{HR}	Holding range PLL	-	±1.2	kHz
f_{CR}	Catching range PLL	±0.6		kHz
S/N	Signal-to noise ratio of the video input signal at which the time constant is switched	14	26	dB
H	Hysteresis at the switching point	2.5	3.9	dB
SECOND CONTROL LOOP				
$\Delta\varphi_i/\Delta\varphi_o$	Control sensitivity	105	195	µs/µs
t_{cr}	control range from start of horizontal output to flyback	11	13	µs
t_{shift}	Maximum horizontal shift range	±2	-	µs
$\Delta\varphi_i/\Delta\varphi_o$	Shift control sensitivity	2.5	3.5	µA/µs
V_{39}	Voltage to switch on the X-ray protection	6	-	V
HORIZONTAL OUTPUT				
V_{OL}	LOW level output voltage	-	0.3	V
n	Duty factor	48	52	%
FLYBACK INPUT/SANDCASTLE OUTPUT				
I_{38}	Required input current during flyback pulse	100	300	µA
V_O	Output voltage during burst key	4.8	5.8	V
V_O	Output voltage during blanking	1.8	2.2	V
V_{lcl}	Clamped input voltage during flyback	2.6	3.4	V

Symbol	Parameter	Guaranteed Limits		Unit
		Min	Max	
t_W	Burst key pulse width	3.3	3.7	µs
t_W	Vertical blanking pulse width	14	14	lines
t_d	Delay of start of burst key to start of sync	5.2	5.6	µs
VERTICAL SECTION				
f_{lock}	Locking range	45	64.5	Hz
LF	Locking range (lines/frame)	488	722	
VERTICAL RAMP GENERATOR				
I_{43}	Input current during scan	-	2.0	µA
I_{dis}	Discharge current during retrace	0.28	0.52	mA
$V_{saw(p-p)}$	Sawtooth amplitude (peak-to-peak value)	1.3	1.7	V
t_d	Delay from field-to-field	-	1.6	µs
VERTICAL OUTPUT				
$V_{O(max)}$	Maximum available output voltage	4	-	V
$V_{O(min)}$	Minimum available output voltage	-	0.3	V
VERTICAL FEEDBACK INPUT				
V_{42}	DC input voltage	2.0	3.0	V
V_{42}	AC input voltage	0.7	1.3	V
I_{42}	Input current	-	15	µA
Δt_p	Internal pre-correction to sawtooth	2.1	3.9	%
$\Delta T/\Delta V$	Temperature dependency on amplitude	-	1	%
V_{GL}	Vertical guard switching level with respect to the DC feedback level; switching level LOW	-1.5	-	V
V_{GH}	Vertical guard switching level with respect to the DC feedback level; switching level HIGH	-	+1.5	V
t_d	Delay of scan start	98	182	ms
Colour demodulation part				
CHROMINANCE AMPLIFIER				
ΔCC_{or}	AGC control range	26	-	dB
ΔV	Change in amplitude of the output signals over the ACC range	-	2	dB
THR_{on}	Threshold colour killer ON	-30	-38	dB
HYS_{off}	Hysteresis colour killer OFF	+2	+6	dB
CHROMINANCE AMPLIFIER				
Phase-locked loop				
f_{CR}	Catching range	±300	-	Hz
$\Delta\varphi$	Phase shift for ±200 Hz deviation of the oscillator frequency	-	2	deg
Oscillator				
TC	Temperature coefficient of f_{OSC}	-	2.5	Hz/K
Δf	f_{OSC} deviation with respect to V_P	-	250	HZ
R_I	Input resistance (pin 34)	1.05	1.95	kΩ

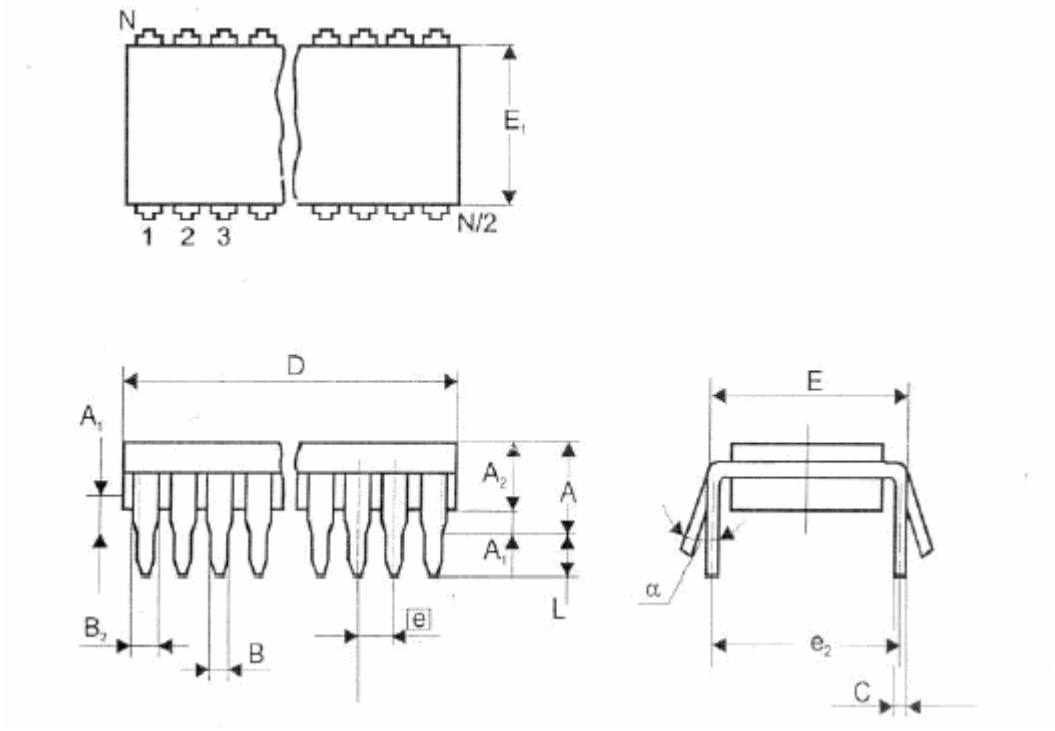
Symbol	Parameter		Guaranteed Limits		Unit
			Min	Max	
R_I	input resistance (pin 35)		0.91	1.69	kΩ
C_I	Input capacitance (pins 34 and 35)		-	10	pF
HUE CONTROL AND CHROMINANCE OUTPUT					
CR_{HUE}	Hue control range		±45	-	deg
ΔH	Hue variation for ±10% V_P		-5	+5	deg
ΔH/ΔT	Hue variation with temperature		-5	+5	deg
V_O	Chrominance output signal (peak-to-peak value)		100	450	mV
DEMODULATOR					
V_{30}	(R-Y) output signal amplitude (peak-to-peak value)		0.47	0.58	V
V_{31}	(B-Y) output signal amplitude (peak-to-peak value)		0.60	0.75	V
G	Gain ratio of both demodulators G(B-Y)/ G(R-Y)		1.6	1.96	
SOS	Spread of signal amplitude ratio PAL/NTSC		-1	+1	dB
Z_O	Output impedance (R-Y)/(B-Y) output		-	250	Ω
B	Bandwidth of demodulators		0.9	-	MHz
V_{30}	Residual carrier output voltage (peak-to-peak value)		-	15	mV
V_{30}	H/2 ripple at (R-Y) output (peak-to-peak value)		-	25	mV
$\Delta V_O/\Delta T$	Change of output signal amplitude with temperature		-	1	%/K
$\Delta V_O/\Delta V_C$	Change of output signal amplitude with supply voltage		-0.1	0.1	dB
φ_e	Phase error in the demodulated signals		-	5	deg
REFERENCE SIGNAL OUTPUT					
f_{ref}	Reference frequency		4.4238	4.4432	MHz
V_{32}	Output signal amplitude (peak-to-peak value)		0.2	0.3	V
V_O	Output voltage level	PAL/NTSC identified	1.2	1.8	V
		SECAM identified	3.3	5.5	V
I_{32}	Required current to force combination in SECAM mode		150	-	μA
Control part					
SATURATION CONTROL					
CRs	Saturation control range		52	-	dB
ΔS/ΔV	Saturation level change		-10	+10	%
CONTRAST CONTROL					
CRc	Contrast control range		18	24	dB
TBT	Tracking between the three channels over a control range of 10 dB		-	0.7	dB
BRIGHTNESS CONTROL					
CRb	Bridhtness control range		±0.6	±1.3	V
RGB AMPLIFIERS					
V_O	Output signal amplitudes (peak-to-peak value) Nominal luminance input signal and nominal contrast		2.8	5.2	V

Symbol	Parameter		Guaranteed Limits		Unit
			Min	Max	
V_{obl}	Blanking level at the RGB outputs		0.7	0.9	V
V_{ob}	Black level at the RGB outputs		2.4	3.0	V
V_{max}	Maximum peak white level		4.1	5.3	V
Z_O	Output impedance		70	130	Ω
RS	Relative spread between the RGB output signals		-	5	%
S/N	Signal-to-noise ratio of output signals for RGB input for CVBS input		 42 50	 - -	 dB dB
f_{res}	Residual frequency at f_{OSC} in the RGB outputs (peak-to-peak value)		-	25	mV
f_{res}	Residual frequency at $2f_{OSC}$ plus higher harmonics in the RGB outputs (peak-to-peak value)		-	25	mV
V_{diff}	Difference in black level between the three outputs	Nominal brightness	-	50	mV
$\Delta b/\Delta T$	Variation of black level with temperature		-2	0	mV/K
V_{diff}	Differential drift of black level over a temperature range of 40°C		-	10	mV
B	Bandwidth of output signals for RGB input CVBS input CVBS input S-VHS input		 8 2.8 3.5 8	 - 3 4 -	 Mhz Mhz Mhz MHZ

RECOMMENDED FUNCTIONAL SCHEME OF TV



52-Pin Plastic Dual-in-Line (NS)



Dimension, mm		
A	**max**	5.08
A1	**min**	0.51
A_2	**min**	3.05
	max	4.57
B	**min**	0.38
	max	0.56
B_2	**min**	0.89
	max	1.14
C	**min**	0.23
	max	0.38
D	**min**	45.72
	max	46.23
E	**min**	15.24
	max	16.00
E_1	**min**	12.70
	max	14.48
e	**nom**	1.778
e_2	**nom**	15.24
L	**min**	2.54
	max	3.56
α	**min**	0º
	max	10º