I^2C BUS CONTROLLED SINGLE CHIP TV-RECEIVER

The KKA 8842 is I^2C-bus controlled single chip TV processor which is intended to be applied in PAL, NTSC, PAL/NTSC and multi-standard television receivers.

FEATURES

The following features are available:
- Multi-standard vision IF circuit with an alignment-free PLL demodulator without external components
- Alignment-free multi-standard FM sound demodulator (4.5 MHz to 6.5 MHz)
- Audio switch
- Automatic Volume Limiting
- Flexible source selection with CVBS switch and Y(CVBS)/C input so that a comb filter can be applied
- Integrated chrominance trap circuit
- Integrated luminance delay line
- Asymmetrical peaking in the luminance channel with a (defeatable) noise coring function
- PAL/SECAM/NTSC decoder
- Base-band delay line for PAL and SECAM or chroma comb filter for NTSC
- Black stretching of non-standard CVBS or luminance signals
- Integrated chroma band-pass filter with switchable centre frequency
- Dynamic skin tone control circuit
- Blue stretch circuit which offsets colours near white towards blue
- RGB control circuit with "Continuous Cathode Calibration" and white point adjustment
- Possibility to insert a "blue back" option when no video signal is available
- Horizontal synchronization with two control loops and alignment-free horizontal oscillator
- Vertical count-down circuit
- Vertical driver optimised for DC-coupled vertical output stages
- I^2C-bus control of various functions

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
Supply					
VP	supply voltage	-	8.0	-	V
IP	supply current	-	110	-	mA
Input voltages					
ViVIFrms)	video IF amplifier sensitivity (RMS value)	-	35	-	µV
ViSIF(rms)	sound IF amplifier sensitivity (RMS value)	-	1.0	-	mV
ViAUDIO(rms)	external audio input (RMS value)	-	350	-	mV
ViCVBS(p-p)	external CVBS/Y input (peak-to-peak value)	-	1.0	-	V
ViCHROMA(p-p)	external chroma input voltage (burst amplitude) (peak-to-peak value)	-	0.3	-	V
ViRGB(p-p)	RGB inputs (peak-to-peak value)	-	0.7	-	V
Output signals					
VoCVBS(p-p)	demodulated CVBS output (peak-to-peak value)	-	2.2	-	V
IoTUNER	tuner AGC output current range	0	-	5	mA
VoVIDSW(p-p)	CVBS1/CVBS2 output voltage of video switch (peak-to-peak value)	-	2.0/ 1.0	-	V
VoB-Y(p-p)	-(R-Y) output/input voltage (peak-to-peak value)	-	1.05	-	V
VoR-Y(p-p)	-(B-Y) output/input voltage (peak-to-peak value)	-	1.33	-	V
VoY(p-p)	Y output/input voltage (peak-to-peak value)	-	1.4	-	V
VoRGB(p-p)	RGB output signal amplitudes (peak-to-peak value)	-	2.0	-	V
IoHOR	horizontal output current	10	-	-	mA
IoVERT	vertical output current (peak-to-peak value)	-	1	-	mA

PINNING

SYMBOL	PIN	DESCRIPTION
SNDIF	1	Sound IF input
AUDIOEXT	2	External audio input
NC	3	not connected
NC	4	not connected
PLLLF	5	IF-PLL loop filter
IFVO	6	IF video output
SCL	7	serial clock input
SDA	8	serial data input/output
DECBG	9	bandgap decoupling
CHROMA	10	chrominance input (S-VHS)
CVBS/Y	11	external CVBS/Y input
VP1	12	main supply voltage (+8 V)
CVBSINT	13	internal CVBS input
GND1	14	ground 1
AUDIOOUT	15	audio output
SECPLL	16	SECAM PLL decoupling
CVBSEXT	17	external CVBS input

BLKIN	18	black-current input
BO	19	blue output
GO	20	green output
RO	21	red output
BCLIN	22	beam current limiter input/V-guard input
RI	23	red input for insertion
GI	24	green input for insertion
BI	25	blue input for insertion
RGBIN	26	RGB insertion input
LUMIN	27	not connected
LUMOUT	28	luminance output
BYO	29	(B-Y) signal output
RYO	30	(R-Y) signal output
BYI	31	(B-Y) signal input (not available)
RYI	32	(R-Y) signal input (not available)
REFO	33	subcarrier reference output
XTAL1	34	3.58 MHz crystal connection
XTAL2	35	4.43/3.58 MHz crystal connection
DET	36	loop filter phase detector
VP2	37	2nd supply voltage (+8 V)
CVBS1O	38	CVBS-1 output
DECDIG	39	Decoupling digital supply
HOUT	40	horizontal output
FBISO	41	flyback input/sandcastle output
PH2LF	42	phase-2 filter
PH1LF	43	phase-1 filter
GND2	44	ground 2
AVL	45	AVL capacitor
VDRB	46	vertical drive B output
VDRA	47	vertical drive A output
IFIN1	48	IF input 1
IFIN2	49	IF input 2
EHTO	50	EHT/overvoltage protection input
VSC	51	vertical sawtooth capacitor
Iref	52	reference current input
DECAGC	53	AGC decoupling capacitor
AGCOUT	54	tuner AGC output
AUDEEM	55	Audio deemphasis
DECSDEM	56	Decoupling sound demodulator

Start-up procedure

Read the status bytes until POR = 0 and send all subaddress bytes. The horizontal output signal is switched-on when the oscillator is calibrated.

Each time before the data in the IC is refreshed, the status bytes must be read. If POR = 1, the procedure mentioned above must be carried out to restart the IC.

When this procedure is not followed the horizontal frequency may be incorrect after power-up or after a power dip.

Valid subaddresses: 00 to 1A (subaddresses 04 to 07 and 17 are not used), subaddress FE is reserved for test purposes.Auto-increment mode available for subaddresses.

Table 1 Input status bits.

FUNCTION	SUB ADDRESS (HEX)	DATA BYTE							
		D7	D6	D5	D4	D3	D2	D1	D0
Control 0	00	INA	INB	INC	BCO	FOA	FOB	XA	XB
Control 1	01	FORF	FORS	DL	STB	POC	CM2	CM1	CM0
Hue	02	AVL	AKB	A5	A4	A3	A2	A1	A0
Horizontal shift (HS)	03	VIM	GAI	A5	A4	A3	A2	A1	A0
Vertical slope (VS)	08	NCIN	STM	A5	A4	A3	A2	A1	A0
Vertical amplitude (VA)	09	VID	LBM	A5	A4	A3	A2	A1	A0
S-correction (SC)	0A	0	EVG	A5	A4	A3	A2	A1	A0
Vertical shift (VSH)	0B	SBL	PRD	A5	A4	A3	A2	A1	A0
White point R	0C	0	0	A5	A4	A3	A2	A1	A0
White point G	0D	0	0	A5	A4	A3	A2	A1	A0
White point B	0E	MAT	0	A5	A4	A3	A2	A1	A0
Peaking	0F	0	0	A5	A4	A3	A2	A1	A0
Brightness	10	RBL	COR	A5	A4	A3	A2	A1	A0
Saturation	11	IE1	0	A5	A4	A3	A2	A1	A0
Contrast	12	AFW	IFS	A5	A4	A3	A2	A1	A0
AGC take-over	13	MOD	VSW	A5	A4	A3	A2	A1	A0
Volume control	14	SM	FAV	A5	A4	A3	A2	A1	A0
Adjustment IF-PLL	15	IFA	IFB	IFC	0	0	0	0	0
Control 2	18	OSO	VSD	CB	BLS	BKS	0	0	BB
Control 3	19	HOB	BPS	ACL	CMB	AST	CL2	CL1	CL0
Control 4	1A	0	0	0	0	0	0	FFI	EBS
Control 5	1B	0	0	0	0	0	0	0	FCO

Table 2 Output status bits.

FUNCTION	SUB ADDRESS (HEX)	DATA BYTE							
		D7	D6	D5	D4	D3	D2	D1	D0
Output status bytes	00	POR	FSI	X	SL	XPR	CD2	CD1	CD0
	01	NDF	IN1	X	IFI	AFA	AFB	SXA	SXB
	02	N2	X	BCF	IVW	ID3	ID2	ID1	ID0

Table 3 Characteristics

Parameter	Conditions	min	Typ.	max	unit
Supplies					
POWER SUPPLY (PINS 12 AND 37)					
supply voltage		7,2	8	8,8	V
supply current pin 12		-	70	-	mA
supply current pin 37		-	60	-	mA
total power dissipation		-	1040	-	mW
IF circuit					
VISION IF AMPLIFIER INPUTS (PINS 48 AND 49)					
input sensitivity (RMS value)	f_i = 38.90 MHz	10	35	100	μV
	f_i = 45.75 MHz	10	35	100	μV
	f_i = 58.75 MHz	10	35	100	μV
input resistance (differential)		-	2	-	k
input capacitance (differential)		-	3	-	pF
gain control range		64	75	-	dB
maximum input signal (RMS value)		150	-	-	mV
PLL DEMODULATOR (PLL FILTER ON PIN 5);					
Free-running frequency of VCO	PLL not locked, deviation from nominal setting	-500	-	+500	kHz
Catching range PLL		-	2	-	MHz
Acquisition time PLL		-	-	20	ms
VIDEO AMPLIFIER OUTPUT (PIN 6);					
zero signal output level	negative modulation;	-	4,2	-	V
	positive modulation;	-	2,2	-	V
top sync level	negative modulation	1,8	1,9	2	V
white level	positive modulation	-	4,4	-	V
Difference in amplitude between negative and positive modulation		-	0	15	%
video output impedance		-	50	-	
Internal bias current of NPN emitter follower output transistor		1	-	-	mA
maximum source current		-	-	5	mA

Bandwidth of demodulated output signal	at -3 dB	6	9	-	MHz
Differential gain		-	2	5	%
Differential phase		-	-	5	deg
video non-linearity		-	-	5	%
white spot clamp level		-	6	-	V
noise inverter clamping level		-	1,5	-	V
noise inverter insertion level (identical to black level)		-	2,7	-	V
Intermodulation					
Blue	Vo = 0.92 or 1.1 MHz	60	66	-	dB
	Vo = 2.66 or 3.3 MHz	60	66	-	DB
Yellow	Vo = 0.92 or 1.1 MHz	56	62	-	dB
	Vo = 2.66 or 3.3 MHz	60	66	-	dB
signal-to-noise ratio					
	Weighted	56	60	-	dB
	Unweighted	49	53	-	dB
Residual carrier signal		-	5,5	-	mV
Residual 2nd harmonic of carrier signal		-	2,5	-	mV
IF AND TUNER AGC;					
Timing of IF-AGC with a 2.2 µF capacitor (pin 53)					
Modulated video interference	30% AM for 1 mV to 100 mV; 0 to 200 Hz (system B/G)	-	-	10	%
Response time to IF input signal amplitude increase of 52 dB	positive and negative modulation	-	2	-	ms
Response to an IF input signal amplitude decrease of 52 dB	negative modulation	-	50	-	ms
	positive modulation	-	100	-	ms
allowed leakage current of the AGC capacitor	negative modulation	-	-	10	µA
	positive modulation	-	-	200	nA
Tuner take-over adjustment (via I2C-bus)					
minimum starting level for tuner take-over (RMS value)		-	0,2	0,8	mV
maximum starting level for tuner take-over (RMS value)		40	60	-	mV
Tuner control output (pin 54)					
maximum tuner AGC output voltage	maximum tuner gain;	-	-	9	V
output saturation voltage	Minimum tuner gain; IO = 2 mA	-	-	300	mV
maximum tuner AGC output swing		5	-	-	mA
leakage current RF AGC		-	-	1	µA
input signal variation for complete tuner control		0,5	2	4	dB
AFC OUTPUT (VIA I2C-BUS);					
AFC resolution		-	2	-	bits
window sensitivity		-	125	-	kHz
window sensitivity in large window mode		-	275	-	kHz
VIDEO IDENTIFICATION OUTPUT (VIA I2C-BUS)					

delay time of identification after the AGC has stabilized on a new transmitter		-	-	10	ms
Sound circuit					
DEMODULATOR INPUT; (PIN 1)					
input limiting for PLL catching range (RMS value)		-	1	2	mV
Catching range PLL		4,2	-	6,8	MHz
input resistance		-	8,5	-	k
input capacitance		-	-	5	pF
AM rejection	VI = 50 mV RMS;	60	66	-	dB
DE-EMPHASIS (PIN 55)					
output signal amplitude (RMS value)		-	500	-	mV
output resistance		-	15	-	k
DC output voltage		-	3	-	V
AUDIO OUTPUT (PIN 15)					
Controlled output signal amplitude (RMS value)	-6 dB;	500	700	900	mV
output resistance		-	500	-	
DC output voltage		-	3	-	V
total harmonic distortion		-	0,15	0,5	%
total harmonic distortion	FAV = 1;	-	0,15	0,5	%
power supply rejection		-	25	-	dB
Internal signal-to-noise ratio		-	60	-	dB
External signal-to-noise ratio		-	80	-	dB
output level variation with temperature		-	-	tbf	dB
control range		-	80	-	dB
Suppression of output signal when mute is active		-	80	-	dB
DC shift of the output when mute is active		-	50	100	mV
EXTERNAL AUDIO INPUT; (PIN 2)					
input signal amplitude (RMS value)		-	500	2000	mV
input resistance		-	25	-	k
voltage gain difference between input and output	maximum volume	-	9	-	dB
Crosstalk between internal and external audio signals		60	-	-	dB
AUTOMATIC VOLUME LEVELLING; CAPACITOR CONNECTED TO PIN 45;					
gain at maximum boost		-	6	-	dB
gain at minimum boost		-	-14	-	dB
charge (attack) current		-	1	-	mA
Discharge (decay) current		-	200	-	nA
control voltage at maximum boost		-	1	-	V
control voltage at minimum boost		-	5	-	V
CVBS, Y/C, RGB, CD AND LUMINANCE OUT- AND INPUTS					
CVBS-Y/C SWITCH, PINS 10, 11, 13, 17 AND 38					
CVBS or Y input voltage (peak-to-peak value)		-	1	1,4	V
CVBS or Y input current		-	4	-	µA
suppression of non-selected CVBS input signal		50	-	-	dB
chrominance input voltage (burst amplitude)		-	0,3	1	V

chrominance input impedance		-	50	-	k
output signal amplitude (CVBS1) (peak-to-peak value)		-	2	-	V
black level of CVBS1		-	2,1	-	V
output impedance		-	-	250	
RGB INPUTS, PINS 23 TO 25					
input signal amplitude for an output signal of 2 V (black-to-white) (peak-to-peak value)		-	0,7	0,8	V
input signal amplitude before clipping occurs (peak-to-peak value)		1	-	-	V
difference between black level of internal and external signals at the outputs		-	-	20	mV
input currents	no clamping;	-	0,1	1	µA
delay difference for the three channels		-	0	20	ns
FAST BLANKING, PIN 26					
input voltage	no data insertion	-	-	0,4	V
	data insertion	0,9	0,6	-	V
maximum input pulse	insertion	-	-	3	V
delay time from RGB in to RGB out	data insertion;	-	-	60	ns
delay difference between insertion to RGB out and RGB in to RGB out	data insertion;	-	-	20	ns
input current		-	-	0,2	mA
suppression of internal RGB signals	insertion; fi = 0 to 5 MHz	-	55	-	dB
suppression of external RGB signals	no insertion; fi = 0 to 5 MHz	-	55	-	dB
input voltage to blank the RGB outputs to facilitate `On Screen Display' signals being applied to the outputs	only on pin 26 (pin 38 for the ILA 885X)	4	-	-	V
COLOUR DIFFERENCE OUTPUT AND INPUT SIGNALS (PINS 29, 30, 31 AND 32);					
signal amplitude (R-Y) (peak-to-peak value)		-	1,05	-	V
signal amplitude (B-Y) (peak-to-peak value)		-	1,33	-	V
LUMINANCE INPUTS AND OUTPUTS (PIN 28);					
output signal amplitude (peak-to-peak value)	top sync-white	-	1,4	-	V
top sync level		-	2	-	V
output impedance		-	250	-	
Chrominance filters					
CHROMINANCE TRAP CIRCUIT;					
trap frequency		-	fosc	-	MHz
Bandwidth at fSC = 3.58 MHz	-3 dB	-	2,8	-	MHz
Bandwidth at fSC = 4.43 MHz	-3 dB	-	3,4	-	MHz
colour subcarrier rejection	at nominal peaking	20	30	-	dB
trap frequency during SECAM		-	4,3	-	MHz
CHROMINANCE BANDPASS CIRCUIT					
centre frequency (CB = 0)		-	fosc	-	MHz
centre frequency (CB = 1)		-	1,1xfosc -	MHz	
bandpass quality factor		-	3	-	
CLOCHE FILTER					
centre frequency		4,26	4,29	4,31	MHz

Bandwidth		241	268	295	kHz

LUMINANCE PROCESSING

Y DELAY LINE					
delay time		-	480	-	ns
bandwidth of internal delay line		8	-	-	MHz
PEAKING CONTROL;					
width of preshoot or overshoot		-	160	-	ns
peaking signal compression threshold		-	50	-	IRE
overshoot at maximum peaking	positive	-	45	-	%
	negative	-	80	-	%
Ratio negative/positive overshoot		-	1,8	-	
peaking control curve	63 steps				
CORING STAGE					
coring range		-	15	-	IRE
BLACK LEVEL STRETCHER;					
Maximum black level shift		15	21	27	IRE
level shift at 100% peak white		-1	0	1	IRE
level shift at 50% peak white		-1	-	3	IRE
level shift at 15% peak white		6	8	10	IRE
Horizontal and vertical synchronization and drive circuits					
SYNC VIDEO INPUT (PINS 11, 13 AND 17)					
sync pulse amplitude		50	300	350	mV
slicing level for horizontal sync		-	50	-	%
slicing level for vertical sync		-	30	-	%
HORIZONTAL OSCILLATOR					
free running frequency		-	15625	-	Hz
spread on free running frequency		-	-	±2	%
frequency variation with respect to the supply voltage	VP = 8.0 V ±10%;	-	0,3	0,5	%
frequency variation with temperature	Tamb = 0 to 70°C;	-	-	100	Hz
FIRST CONTROL LOOP (FILTER CONNECTED TO PIN 43);					
holding range PLL		-	±0,9	±1,2	kHz
catching range PLL		±0,6	±0,9	-	kHz
signal-to-noise ratio of the video input signal at which the time constant is switched		-	20	-	dB
hysteresis at the switching point		-	3	-	dB
SECOND CONTROL LOOP (CAPACITOR CONNECTED TO PIN 42)					
control sensitivity		-	120	-	µs/µs
control range from start of horizontal output to flyback at nominal shift position		-	19	-	µs
horizontal shift range	63 steps	±2	-	-	µs
control sensitivity for dynamic compensation		-	7,6	-	µs/V
Voltage to switch-on the "flash" protection		6	-	-	V
Input current during protection		-	-	1	mA
HORIZONTAL OUTPUT (PIN 40);					
LOW level output voltage	IO = 10 mA	-	0,4	tbf	V
maximum allowed output current		10	-	-	mA
maximum allowed output voltage		-	-	VP	V

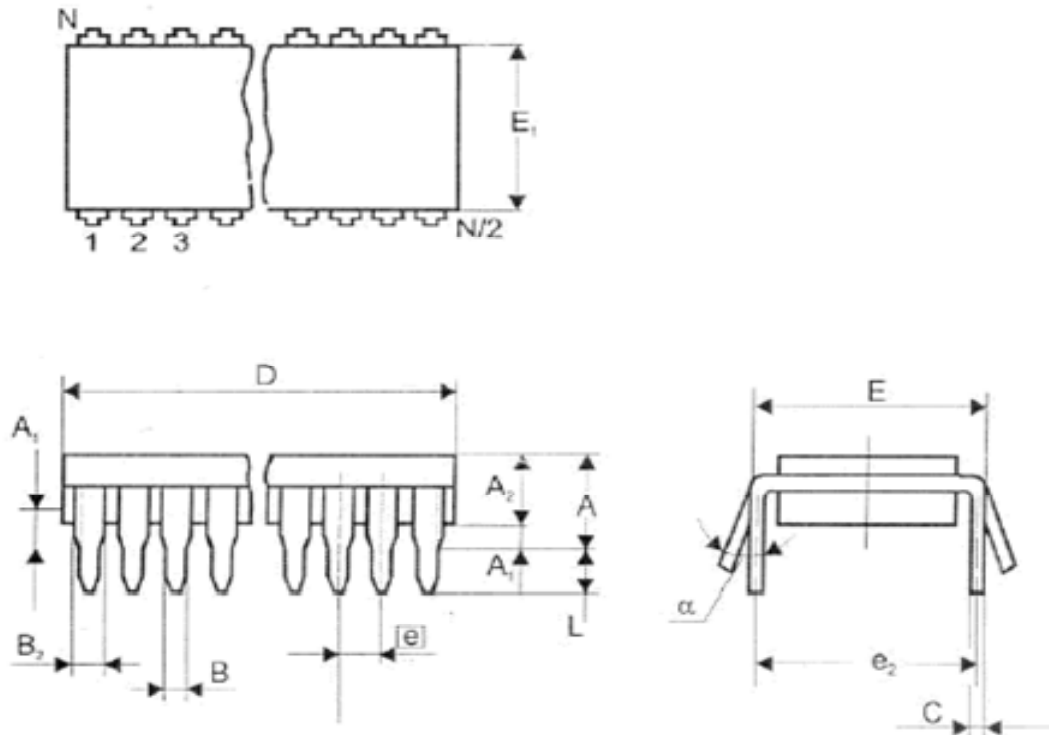|					
duty factor	VOUT = HIGH,	-	45	-	%
frequency during switch-on and switch-off		-	2xfH	-	
duty factor during switch-on and switch-off		-	72	-	%
switch-on time		-	100	-	ms
switch-off time with RGB drive maximum		-	100/80	-	ms
switch-off time with RGB drive minimum		-	60	-	ms
FLYBACK PULSE INPUT AND SANDCASTLE OUTPUT (PIN 41)					
required input current during flyback pulse		100	-	300	µA
output voltage	during burst key	4,8	5,3	5,8	V
	during blanking	1,9	2,1	2,3	V
clamped input voltage during flyback		2,6	3	3,4	V
pulse width	burst key pulse	3,3	3,5	3,7	µs
	vertical blanking	-	14	-	lines
delay of start of burst key to start of sync		5,2	5,4	5,6	µs
VERTICAL OSCILLATOR;					
free running frequency		-	50/60	-	Hz
locking range		45	-	64,5/72	Hz
divider value not locked		-	625/525	-	lines
locking range		434/488	-	722	lines/frame
VERTICAL RAMP GENERATOR (PIN 51 AND 52)					
sawtooth amplitude (peak-to-peak value)	VS = 1FH; C = 100 nF; R = 39 k	-	3	-	V
discharge current		-	0,9	-	mA
charge current set by external resistor		-	16	-	µA
vertical slope	control range (63 steps)	-20	-	+20	%
charge current increase	f = 60 Hz	-	19	-	%
LOW level of ramp		-	2,3	-	V
VERTICAL DRIVE OUTPUTS (PINS 46 AND 47)					
differential output current (peak-to-peak value)	VA = 1FH	-	0,95	-	mA
common mode current		-	400	-	µA
output voltage range		0	-	4	V
EHT TRACKING/OVERVOLTAGE PROTECTION (PIN 50)					
input voltage		1,2	-	2,8	V
scan modulation range		-5	-	+5	%
vertical sensitivity		-	6,3	-	%/V
overvoltage detection level		-	3,9	-	V
DE-INTERLACE					
first field delay		-	0,5H	-	
VERTICAL AMPLITUDE					
control range	63 steps; SC = 00H	80	-	120	%
equivalent differential vertical drive output current (peak-to-peak value)	SC = 00H	760	-	1140	µA

VERTICAL SHIFT					
control range	63 steps	-5	-	+5	%
equivalent differential vertical drive output current (peak-to-peak value)		-50	-	+50	µA
S-CORRECTION					
control range	63 steps	0	-	30	%
Colour demodulation part					
CHROMINANCE AMPLIFIER					
ACC control range		26	-	-	dB
change in amplitude of the output signals over the ACC range		-	-	2	dB
threshold colour killer ON		-30	-	-	dB
hysteresis colour killer OFF	strong signal conditions; S/N>40 dB;	-	+3	-	dB
	noisy input signals;	-	+1	-	dB
ACL CIRCUIT;					
chrominance burst ratio at which the ACL starts to operate		-	3	-	
REFERENCE PART					
Phase-locked loop;					
catching range		±360	±600	-	Hz
phase shift for a ±400 Hz deviation of the oscillator frequency		-	-	2	deg
Oscillator					
temperature coefficient of the oscillator frequency		-	-	1	Hz/K
oscillator frequency deviation with respect to the supply	VP = 8 V ±10%	-	-	25	Hz
minimum negative resistance		-	-	1	k
maximum load capacitance		-	-	15	pF
HUE CONTROL					
hue control range	63 steps;	±35	±40	-	deg
hue variation for ±10% VP		-	0	-	deg
hue variation with temperature	Tamb = 0 to 70 °C;	-	0	-	deg
DEMODULATORS (PINS 29 AND 30)					
General					
(R-Y) output signal amplitude (peak-to-peak value)		-	1,05	-	V
(B-Y) output signal amplitude (peak-to-peak value)		-	1,33	-	V
spread of signal amplitude ratio between standards		-1,5	-	1,5	dB
output impedance (R-Y)/(B-Y) output		-	500	-	
bandwidth of demodulators	-3 dB;	-	650	-	kHz
PAL/NTSC demodulator					
gain between both demodulators G(B-Y) and G(R-Y)		1,6	1,78	1,96	
residual carrier output (peak-to-peak value); only valid for PAL and NTSC signals	f = fosc; (R-Y) output	-	-	10	mV
	f = fosc; (B-Y) output	-	-	10	mV
	f = 2fosc; (R-Y) output	-	-	10	mV
	f = 2fosc; (B-Y) output	-	-	10	mV
H/2 ripple at (R-Y) output (peak-to-peak value)		-	-	25	mV

change of output signal amplitude with temperature		-	0,1	-	%/K
change of output signal amplitude with supply voltage		-	-	±0,2	dB
phase error in the demodulated signals		-	-	±8	deg
SECAM demodulator					
black level off-set		-	-	7	kHz
pole frequency of deemphasis		77	85	93	kHz
ratio pole and zero frequency		-	3	-	
non linearity		-	-	3	%
calibration voltage pin 16		3	4	5	V
Base-band delay line					
variation of output signal for adjacent time samples at constant input signals		-0,1	-	0,1	dB
residual clock signal (peak-to-peak value)		-	-	5	mV
delay of delayed signal		63,94	64	64,06	µs
delay of non-delayed signal		40	60	80	ns
difference in output amplitude with delay on or off		-	-	5	%
COLOUR DIFFERENCE MATRICES (IN CONTROL CIRCUIT)					
PAL/SECAM mode;					
ratio of demodulated signals ±10%		-	-0,51	-	
ratio of demodulated signals ±25%		-	-0,19	-	
NTSC mode; the matrix results in the following signals (nominal hue setting)					
(B-Y) signal: 2.03/0°		2.03UR			
(R-Y) signal: 1.59/95°		-0.14UR + 1.58VR			
(G-Y) signal: 0.61/240°		-0.31UR - 0.53VR			
REFERENCE SIGNAL OUTPUT PIN 33;					
reference frequency			3,58/4,43		MHz
output signal amplitude (peak-to-peak value)		0,2	0,25	0,3	V
output level to enable the comb filter		4	4,2	5	V
output level to disable the comb filter		-	0,1	1,4	V
Control part					
SATURATION CONTROL					
Saturation control range	63 syeps	52	-	-	dB
CONTRAST CONTROL;					
contrast control range	63 steps	-	18	-	dB
tracking between the three channels over a control range of 10 dB		-	-	0,5	dB
BRIGHTNESS CONTROL					
brightness control range	63 steps;	-	±0,7	-	V
RGB AMPLIFIERS (PINS 19, 20 AND 21)					
output signal amplitude (peak-to-peak value)	at nominal luminance input signal, nominal contrast and white-point adjustment;	tbf	2	tbf	V
maximum signal amplitude (black-to-white)		-	tbf	-	V

input signal amplitude (Y-input, pin 28) at which the soft clipping is activated		-	tbf	-	V
output signal amplitude for the `red' channel (peak-to-peak value)	at nominal settings for contrast and saturation control and no luminance signal to the input (R-Y, PAL)	tbf	2,1	tbf	V
nominal black level voltage		-	2,4	-	V
black level voltage	when black level stabilisation is switched-off (via AKB bit)	-	2,5	-	V
black level voltage control range	VSD bit active;	1,8	2,5	3,2	V
width of video blanking with HBL bit active		14,4	14,7	15	µs
control range of the black-current stabilisation		-	±1	-	V
blanking level	difference with black level	-	-0,5	-	V
level during leakage measurement		-	-0,1	-	V
level during "low" measuring pulse		-	0,25	-	V
level during "high" measuring pulse		-	0,38	-	V
adjustment range of the ratio between the amplitudes of the RGB drive voltage and the measuring pulses		-	±3	-	dB
variation of black level with temperature		-	1	-	mV/K
relative variation in black level between the three channels during variations of					
supply voltage (±10%)	nominal controls	-	-	tbf	mV
saturation (50 dB)	nominal contrast	-	-	tbf	mV
contrast (20 dB)	nominal saturation	-	-	tbf	mV
brightness (±0.5 V)	nominal controls	-	-	tbf	mV
temperature (range 40 °C)		-	-	tbf	mV
signal-to-noise ratio of the output signals	RGB input;	60	-	-	dB
	CVBS input;	50	-	-	dB
residual voltage at the RGB outputs (peak-to-peak value)	at fosc	-	-	15	mV
	at 2fosc plus higher harmonics	-	-	15	mV
bandwidth of output signals	RGB input; at -3 dB	9	-	-	MHz
	CVBS input; at -3 dB; fosc = 3.58 MHz	-	2,8	-	MHz
	CVBS input; at -3 dB; fosc = 4.43 MHz	-	3,5	-	MHz
	S-VHS input; at -3 dB	6	-	-	MHz
WHITE-POINT ADJUSTMENT					
I2C-bus setting for nominal gain	HEX code	-	20H	-	
adjustment range of RGB drive levels		-	±3	-	dB
gain control range to compensate spreads in picture tube characteristics		-	±6	-	dB
2-POINT BLACK-CURRENT STABILISATION (PIN 18);					
amplitude of "low" reference current		-	8	-	µA
amplitude of "high" reference current		-	20	-	µA
acceptable leakage current		-	±100	-	µA

maximum current during scan		-	tbf	-	mA
input impedance		-	tbf	-	
BEAM CURRENT LIMITING (PIN 22);					
contrast reduction starting voltage		-	3	-	V
voltage difference for full contrast reduction		-	1,8	-	V
brightness reduction starting voltage		-	1,9	-	V
voltage difference for full brightness reduction		-	1	-	V
internal bias voltage		-	3,3	-	V
detection level vertical guard		-	3,65	-	V
minimum input current to activate the guard circuit		-	100	-	µA
maximum allowable current		-	1	-	mA
BLUE STRETCH;					
Decrease of small signal gain for the red and green channel	BLS = 1	-	14	-	%
Decrease of small signal gain for the red channel	EBS = 1	-	22	-	%
Decrease of small signal gain for the green channel	EBS = 1	-	8	-	%
I2C-BUS CONTROL INPUT/OUTPUT (SDA/SCL)					
input voltage level		0	-	5,5	V
low-level input voltage		-	-	1,5	V
high-level input voltage		3,5	-	-	V
low-level input current	Vi = 0 V	-	-	-10	µA
high-level input current	Vi = 5.5 V	-	-	10	µA
low-level output voltage	SDA, IL = 3 mA	-	-	0,4	V

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

Dimension, mm		
A	max	5.08
A₁	min	0.51
A₂	min	3.05
	max	4.57
B	min	0.38
	max	0.56
B₂	min	0.89
	max	1.14
C	min	0.23
	max	0.38
D	min	49.28
	max	49.78
E	min	15.24
	max	16
E₁	min	12.7
	max	14.48
e	nom	1.778
e₂	nom	15.24
L	min	2.54
	max	3.56
α	min	0º
	max	15º