

Small signal combination IC for colour TV

TDA8302

FEATURES

- Gain controlled vision IF amplifier
- Synchronous demodulator for negative demodulation
- AGC detector operating on peak sync
- Tuner AGC
- AFC circuit with sample-and-hold and on/off-switch
- Video preamplifier
- Video switch to select either the internal video signal or an external video signal
- Horizontal synchronization circuit with two control loops
- Vertical synchronization (divider system), ramp generator for 60 Hz only
- Transmitter identification (mute)
- Sandcastle pulse generation
- VCR/auto VCR switch.

GENERAL DESCRIPTION

The device includes a three-stage video IF amplifier, AFC and AGC circuitry, integral three-level sandcastle pulse generator, fully synchronized horizontal and vertical time bases with drive circuits, a video switch and a transmitter identification/mute circuit. A functional colour TV receiver can thus be realised with the addition of a tuner, audio demodulator and amplifier, chrominance decoder and respective line and field deflection circuitry.

ORDERING INFORMATION

EXTENDED TYPE NUMBER	PACKAGE			
	PINS	PIN POSITION	MATERIAL	CODE
TDA8302	32	DIL	plastic	SOT201

FUNCTIONAL DESCRIPTION

Video IF amplifier, demodulator and video amplifier

Each of the three AC-coupled IF stages permits the omission of DC feedback and possesses a control range in excess of 20 dB.

The IF amplifier is followed by a passive synchronous demodulator providing a regenerated carrier signal. This is limited by a logarithmic limiter circuit prior to its application to the demodulator. Improved picture synchronization is provided by a wider bandwidth together with improved video amplifier linearity. The video amplifier contains also a white spot inverter and a noise clamp which limits interference pulses to a point below the peak sync level.

AFC-circuit

The reference signal for the AFC quadrature demodulator can also be acquired from the tuned circuit of the IF synchronous demodulator because an accurate 90° phase shift is realised internally. In this way only one tuned circuit needs to be applied and only one adjustment has to be carried out. The AFC output is affected by the asymmetrical frequency spectrum of the signal fed to the quadrature demodulator, which is determined by the SAW filter characteristic. To overcome this video frequency dependency of the AFC output, the demodulator output is followed by a sample-and-hold circuit. For the reception of negative-going signals, the output is sampled only during peak sync, where a non-modulated carrier is present. Substantial noise will be present on the quadrature demodulator input signal during reception of very weak signals. This noise has an asymmetrical frequency spectrum (with respect to the IF carrier) causing an offset in the AFC output voltage. This effect can be minimized by applying a notch in the demodulator tuned circuit. The sample-and-hold circuit is followed by an amplifier with high output impedance. The steepness of the of the AFC control voltage can be lowered by applying load resistors from the output to the supply and to ground. The AFC output is switched off when the AFC sample pin (22) is connected to ground.

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QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supply						
V_p	supply voltage (pin 8)		10	12	13.2	V
I_p	supply current (pin 8)		90	115	140	mA
I_{start}	start current (pin 12)	note 1	-	6.5	9	mA
Video						
$V_{9-10(mss)}$	IF sensitivity (RMS value)	note 2	25	40	65	μ V
G_{9-10}	IF gain control range		-	74	-	dB
S/N	signal-to-noise ratio	input signal = 10 mV	52	58	-	dB
V_{21}	AFC output voltage swing		10.5	-	11.5	V
Video switch						
$V_{16(p-p)}$	internal video input (peak-to-peak value)	$V_o = 2.5$ V(p-p)	-	2	-	V
$V_{13(p-p)}$	external video input (peak-to-peak value)	$V_o = 2.5$ V(p-p)	-	1	-	V
$V_{15(p-p)}$	video output signal (peak-to-peak value)		2.3	2.5	2.7	V
Sync						
V_{28}	required sync pulse amplitude	note 3	200	750	-	mV
I_{30}	required input current during flyback pulse		0.1	-	2	mA
V_{30}	sandcastle output during burstkey horizontal blanking vertical blanking		8 4 2.1	- 4.4 2.5	- 5 2.9	V V V
V_{14}	video transmitter identification output no signal condition signal condition		- -	0.3 12	- -	V V
V_5	vertical feedback for DC voltage		2.9	3.3	3.7	V
$V_{5(p-p)}$	vertical feedback for AC voltage (peak-to-peak value)		-	1	-	V

Notes to the quick reference data

1. Supplying a current of 9 mA to pin 12 starts the horizontal oscillator. This current can be obtained via a bleed circuit from the mains rectifier whilst the main supply for the device (V_{cc}) is obtained from the horizontal output stage. The load current of the driver must be added to the value given.
2. On set AGC.
3. The minimum value is obtained by connecting a 1.8 k Ω resistor between pins 15 and 28. The slicing level can be varied by changing the value of this resistor (higher resistor value results in larger value of the minimum sync pulse amplitude). The slicing level is independent of the video information.

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Table 1 MUTE truth Table

INPUT/OUTPUT	STATUS	STATUS	STATUS	STATUS	STATUS
Input signal Pins 9 and 10	60 Hz	none	60 Hz	60 Hz	none
output pin 25	9.5 V	0.3 V	9.5 V	9.5 V	0.3 V
input pin 28	60 Hz	none	60 Hz	none	60 Hz
input pin 18	LOW	LOW/ HIGH	HIGH	HIGH	HIGH
output pin 14	12 V	0.3 V	12 V	12 V	0.3 V

Table 2 VCR switch operation

INPUT	VCR MODE	AUTO VCR MODE	TV MODE
pin 17 (pin 18 = LOW)	HIGH	n.c.	LOW

Table 3 Video switch operation

INPUT	INTERNAL VIDEO	EXTERNAL VIDEO
pin 18	LOW	HIGH

LIMITING VALUES

in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_p	supply voltage (pin 8)	-	13.2	V
P_{tot}	total power dissipation	-	2.3	W
T_{stg}	storage temperature range	-55	+150	°C
T_{amb}	operating ambient temperature range	-25	+65	°C

QUALITY SPECIFICATION

Quality level according to UZW-BQ/FQ-601.

SYMBOL	PARAMETER	RANGE A	RANGE B	UNIT
ESD	protection circuit specification (note 1)	2000	500	V
		100	200	pF
		1500	0	Ω

Note to the Quality specification

1. All pins of the IC are protected against ESD by means of the internal clamping diodes. Range A represents the human body model and range B represents the charge device model.

THERMAL RESISTANCE

SYMBOL	PARAMETER	TYP.	MAX.	UNIT
$R_{\theta ja}$	from junction to ambient in free air	30	35	K/W