

TBA 560 C

LUMINANCE AND CHROMINANCE CONTROL COMBINATION

The TBA560C is an integrated circuit for colour television receivers incorporating circuits for the processing and control of the luminance and chrominance signals. It can be used in conjunction with the TBA520 or TBA990, 530, 540, 550 and TCA800 integrated circuits.

The luminance part provides luminance delay line matching, DC contrast control, black level clamp circuit, brightness control and flyback blanking.

The chrominance part provides chroma amplification with ACC, DC chroma gain control which tracks with the contrast control, separate saturation control, burst gate, chroma signal flyback blanking colour killer and PAL delay line driver.

The TBA560C is not an equivalent of the TBA500 and 510 although it performs similar functions to those circuits.

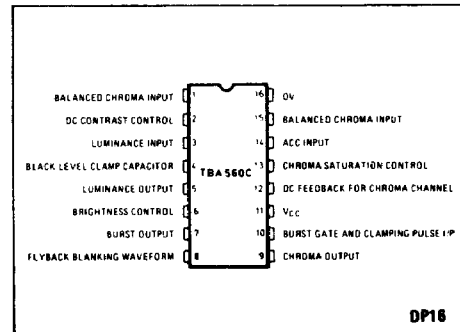


Fig. 1 Pin connections

ABSOLUTE MAXIMUM RATINGS

Voltages are referred to pin 16

Electrical

$V_{11 \text{ max.}}$	Supply voltage (note 1)	13.2V
V_1	0 to +5V	$V_{10 \text{ min.}}$ -5V
V_2	0 to +12V (note 2)	V_{12} -5 to +6V
V_4	0 to +6V	V_{13} -3 to +6.5V (note 2)
V_6	0 to +3V	$V_{14 \text{ min.}}$ -5V
V_8	-5 to +5V	V_{15} 0 to +5V

Currents (positive when flowing into the integrated circuit)

I_1	0 to +1mA	I_9	-10 to 0mA
I_3	-1 to +3mA	$I_{10 \text{ max}}$	+3mA
I_5	-5 to 0mA	$I_{14 \text{ max}}$	+1mA
I_6	-1 to +1mA	I_{15}	0 to +1mA
I_7	-3 to +2mA		

$P_{\text{tot max.}}$	Total power dissipation	
	$T_{\text{amb}} = 60^\circ\text{C}$ (note 1)	580mW

Temperature

Storage temperature	-55°C to $+125^\circ\text{C}$
Operating ambient temperature	-10°C to $+60^\circ\text{C}$

Notes

- Permissible during receiver switch on transient $V_{11 \text{ max.}}$ 16V, $P_{\text{tot max.}}$ 700mW for $t \geq 60\text{sec}$.
- V_2 and V_{13} must always be lower than V_{11}

QUICK REFERENCE DATA

- Supply Voltage (Nom.) (V_{11-16}) 12V
- Supply Current (Nom.) (I_{11}) 30mA
- Luminance Signal Input Current (Typ.) ($I_{3(p-p)}$) 0.4mA
- Luminance Output Signal at Nominal Contrast Setting (Typ.) and Input Current as Above ($V_{5-16(p-p)}$) 1V (See Note 1)
- Chrominance Input Signal (Min.) ($V_{1-15(p-p)}$) 4mV
- Chrominance Input Signal (Max.) $V_{1-15(p-p)}$ 80mV
- Chrominance Output Signal at Nominal Contrast and Saturation Setting (Typ.) ($V_{9-16(p-p)}$) 1V (See Note 1)
- Contrast Control Range $\geq 20\text{dB}$
- Saturation Control Range $\geq 20\text{dB}$
- Burst Output (Closed ACC Loop) (Typ.) ($V_{7-16(p-p)}$) 1V

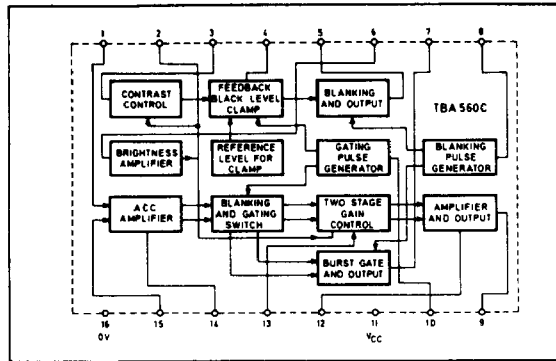


Fig. 2 TBA560C block diagram

ELECTRICAL CHARACTERISTICS

Test Conditions (unless otherwise stated):

$V_{CC} = +12V$, $T_{amb} = +25^{\circ}C$ test circuit = Fig. 6, voltages referred to pin 16

Characteristic	Pin	Value			Units	Conditions
		Min.	Typ.	Max.		
Supply voltage, V_{CC}	11	10.8	12	13.2	V	
Required Input Signals						
Chrominance input signal, p-p value of colour bars with 75% saturation, V_{1-15}	1,15	4		80	mV p-p	
Luminance input current, black-to-white	3		0.4	1.5	mA p-p	
Contrast control voltage range for 20dB control	2	2	3.7	5.6	V	See note 1 and Fig. 3
Brightness control voltage for black level of 1.5V at O/P	6		1.3		V	See note 2 and Fig. 4
Saturation control voltage range 20dB control	13	2.7	4.4	6.2	V	See note 1 and Fig. 5
Flyback blanking pulse amplitude for 0V blanking level at pin 5	8	0	-0.5	-1	V pk	
for 1.5V blanking level at pin 5		-2	-2.5	-3	V pk	
Burst keying (back porch) pulse (+ve going)	10	0.05		3	mA pk	
Colour killer	13	0.5		1	V	
Automatic chrominance control starting level (-ve going)	14		1.2		V	See note 3
Obtainable Output Signals						
Luminance output voltage (black-to-white)	5		1	3	V p-p	$I_3 = 0.4mA$ p-p, $V_2 = 3.7V$
Black level shift				100	mV	See notes 1 and 4
Burst signal amplitude	7		1		V p-p	
Chrominance signal at nominal contrast and saturation	9		1		V p-p	See note 1
3dB bandwidth of chrominance and luminance amplifier			5		MHz	
Change of ratio of luminance to chrominance				2	dB	Contrast control 10dB

NOTES

- Nominal contrast or saturation = maximum value -6dB. Thus, the control is +6 to -14dB on the nominal.
- When V_6 is increased to above 1.7V, the black level of the output signal remains at 2.7V.
- A negative-going potential provides a 26dB ACC range with negligible signal distortion. Maximum gain reduction is obtained at an input voltage of 500mV min.
- Black level shift is specified as that due to changes of contrast and video content at constant brightness setting.

FUNCTIONAL DESCRIPTION

1. Balanced Chroma Signal Input (in conjunction with pin 15)

This is derived from the chroma signal bandpass filter, designed to provide a push-pull input. An input signal amplitude of at least 4mV peak-to-peak is required between pins 1 and 15. Both pins require DC potential of approximately +3.0V. This is derived as a common mode signal from a network connected to pin 7 (burst output). In this way DC feedback is provided over the burst channel to stabilise its operation. All figures for the chrominance signal are based on a colour bar signal with 75% saturation; i.e., burst-to-chroma ratio of input signal is 1:2.

2. DC Contrast Control

With +3.7V on this pin, the gain in the luminance channel is such that a 0.4mA black-to-white input signal to pin 3 gives a luminance output signal amplitude on pin 5 of 1V black-to-white. A variation of voltage on pin 2 between +5.6V and +2V gives a corresponding gain variation of +6 to >−14dB. A similar variation in gain in the chroma channel occurs in order to provide the correct tracking between the two signals. Beam current limiting can be applied via the contrast control network as shown in the peripheral circuit, when a separate overwind is available on the line output transformer.

3. Luminance Signal Input

This terminal has a very low input impedance and acts as a current sink. The luminance signal from the delay line is fed via a series terminating resistor and a DC blocking capacitor and requires to be about 0.4mA peak-to-peak amplitude. A DC bias current is required via a 12k Ω resistor to the +12V line.

4. Charge Storage Capacitor for Black Level Clamp

5. Luminance Signal Output

An emitter follower provides a low impedance output signal of 1V black-to-white amplitude at nominal contrast setting having a nominal black level in the range 0 to +2.7V. An external emitter load resistor is required, not less than 1k Ω . If a greater luminance output is required than 1V, with normal control settings, the input current swing at pin 3 should be increased in proportion.

6. Brightness Control

Over the range of potential +0.9 to +1.7V the black level of the luminance output signal (pin 5) is increased from 0 to +2.7V. The output signal black level remains at +2.7V when the potential on pin 6 is increased above +1.7V.

7. Burst Output

A 1V peak-to-peak burst (controlled by the ACC system) is produced here. Also, to achieve good DC stability by negative feedback in the burst channel the DC potential at this pin is fed back to pins 1 and 15 via the chroma input transformer.

8. Flyback Blanking Input Waveform

Negative going horizontal and vertical blanking pulses may be applied here. If rectangular blanking pulses of not greater than −1V negative excursion, or DC coupled pulses of similar amplitude whose negative excursion is at zero volts DC are applied, the signal level at the luminance output (pin 5) during blanking will be 0V. However, if the blanking pulses applied to pin 8 have an amplitude of −2 to −3V the signal level at the luminance output during blanking will be +1.5V. The negative pulse amplitude should not exceed −5V.

9. Chroma Signal Output

With a 1V peak-to-peak burst output signal (pin 7) and at nominal contrast and saturation setting (pins 2 and 13) the chroma signal output amplitude is 1V peak-to-peak. An external network is required which provides DC negative feedback in the chroma channel via pin 12.

10. Burst Gating and Clamping Pulse Input

A positive pulse of not less than 50 μ A is required on this pin to provide gating in the burst channel and luminance channel black-level clamp circuit. The timing and width of this current pulse should be such that no appreciable encroachment occurs into the sync. pulse or picture line periods during normal operations of the receiver.

11. +12V Supply (V_{CC})

Correct operation occurs within the range 10.8 to 13.2V. All signal and control levels have a linear dependency on supply voltage but, in any given receiver design this range may be restricted due to considerations of tracking between the power supply variations and picture contrast and chroma levels. The power dissipation must not exceed 580mW at 60°C ambient temperature.

12. DC Feedback for Chroma Channel (see pin 9)

13. Chroma Saturation Control

A control range of +6dB to >−14dB is provided over a range of DC potential on pin 13 from 6.2 to 2.7V. Colour killing is also achieved at this terminal by reducing the DC potential to less than +1V, e.g., from the TBA540 colour killer output terminal. The minimum "kill factor" is 40dB.

14. ACC Input

A negative going potential gives an ACC range of about 26dB starting at +1.2V. From 1V to 800mV the steepest part of the characteristic occurs, but a small amount of gain reduction also occurs from 800mV to 500mV. The input resistance is at least 50k Ω .

15. Chroma Signal Input (see pin 1)

16. Negative Supply, 0V (Earth)

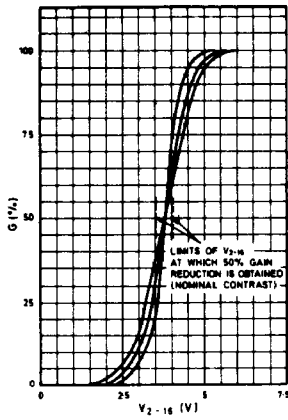


Fig. 3 Contrast control characteristic (luminance amplifier)

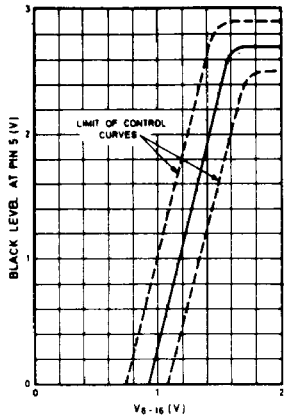


Fig. 4 Control of black level at output of luminance amplifier

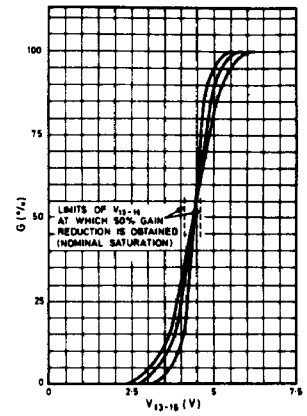


Fig. 5 Chrominance amplifier saturation characteristic

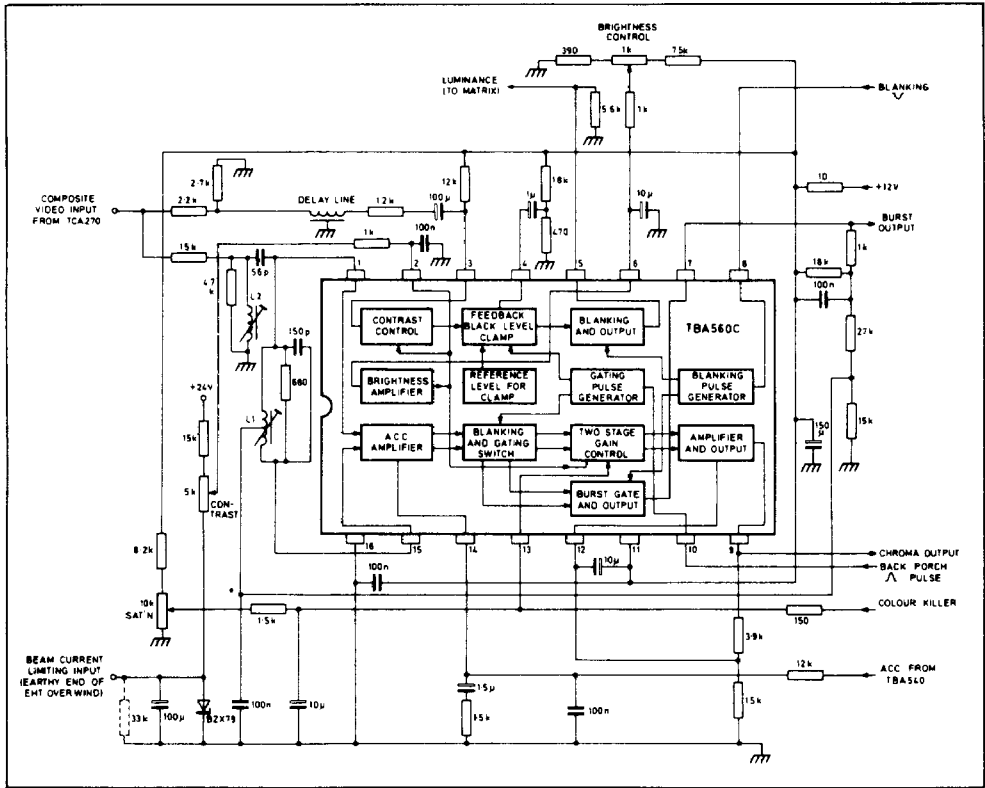


Fig. 6 Application diagram