

RGB MATRIX PREAMPLIFIER

The TBA530 is an integrated circuit for colour television receivers incorporating a matrix preamplifier for RGB cathode or grid drive of the picture tube without clamping circuits. The chip lay-out has been designed to ensure tight thermal coupling between all the transistors in each channel to minimise and equalise thermal drifts between channels. Also, each channel follows an identical lay-out to ensure equal frequency behaviour of the three channels.

QUICK REFERENCE DATA			
Supply voltage	V_{8-6}	nom.	12 V
Ambient temperature	T_{amb}		25 °C
Gain of luminance and colour-difference channels	G	typ.	100
Total current consumption	I_{tot}	typ.	30 mA

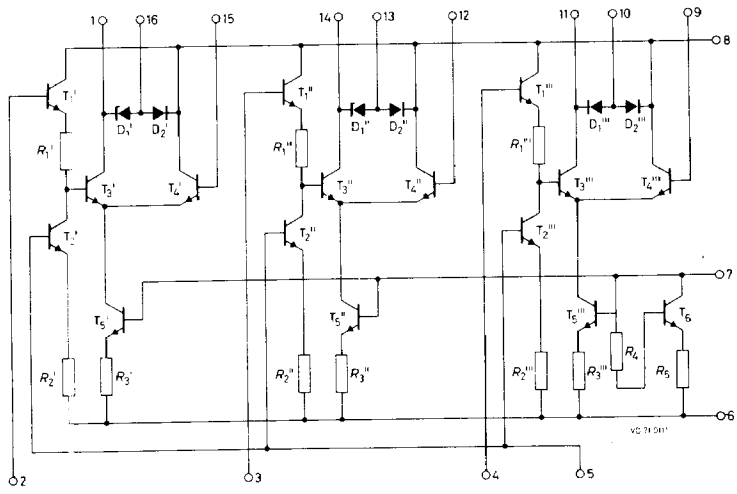
PACKAGE OUTLINES

TBA530 : 16-lead DIL; plastic (SOT-38).

TBA530Q: 16-lead QIL; plastic (SOT-58).



CIRCUIT DIAGRAM



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

Voltage

Supply voltage V_{8-6} max. 13.2 V

Currents

Supply currents $I_1 ; I_{11} ; I_{14}$ max. 10 mA
 $I_{10} ; I_{13} ; I_{16}$ max. 50 mA¹⁾

Power dissipation

Total power dissipation P_{tot} max. 400 mW¹⁾

Temperatures

Storage temperature T_{stg} -55 to +125 °C

Operating ambient temperature T_{amb} -20 to +60 °C

CHARACTERISTICS measured in circuit on page 5

Measuring conditions: $V_{8-6} = 12 \text{ V}$; $T_{amb} = 25 \text{ °C}$
black level: $V_{R-Y} = V_{G-Y} = V_{B-Y} = 7.5 \text{ V}$
 $V_Y = 1.5 \text{ V}$

Colour difference input
peak-to-peak values

V_{2-6} 6(p-p) typ. 1.4 V
 V_{3-6} 6(p-p) typ. 0.82 V
 V_{4-6} 6(p-p) typ. 1.78 V

Luminance input signal (peak-to-peak value) V_{5-16} (p-p) typ. 1 V

Gain of colour channels

(B-Y;G-Y;R-Y) at $f = 0.5 \text{ MHz}$

G_{2-6} }
 G_{3-6} } typ. 100 2)
 G_{4-6} }

Ratio of gain of luminance
amplifier to colour amplifiers

typ. 1

D. C. output voltage

V_R }
 V_G } typ. 165 V
 V_B }

1) At increased voltages due to external failures (e.g. collector-basis breakdown in the output transistors) a maximum current of 50 mA is permitted between pins 16 and 8, 13 and 8, 10 and 8. The maximum allowable dissipation in this case is 500 mW.

2) G is defined as the voltage ratio between the input signals at the pins 2, 3, 4 and the output signals at the collectors of the output transistors.

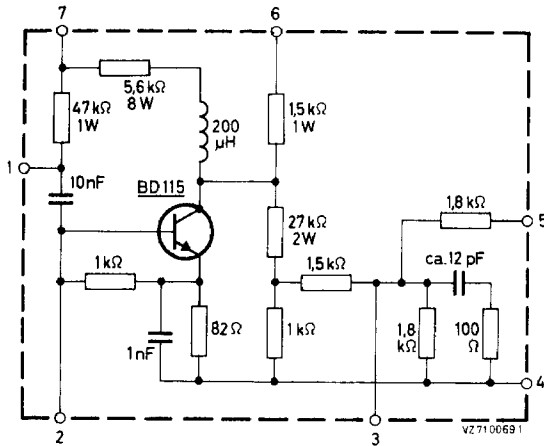
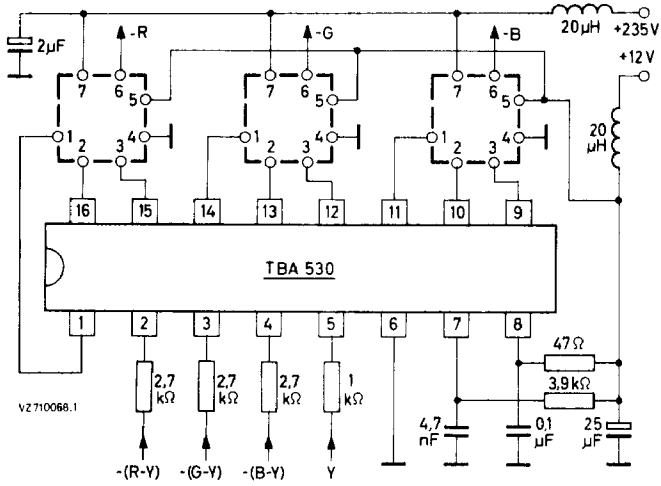
CHARACTERISTICS (continued)

<u>Input resistance</u> of colour difference amplifiers at $f = 1$ kHz	R2-6 } R3-6 } R4-6 }	typ.	60	k Ω
<u>Input capacitance</u> of colour difference amplifiers at $f = 1$ MHz	C2-6 } C3-6 } C4-6 }	typ.	3	pF
<u>Input resistance</u> of luminance amplifier at $f = 1$ kHz	R5-6	typ.	20	k Ω
<u>Input capacitance</u> of luminance amplifier at $f = 1$ MHz	C5-6	typ.	10	pF
<u>Bandwidth</u> of all channels (3 dB)	B	typ.	6	MHz
<u>Total current drain</u>	I _{tot}	typ.	30	mA

PINNING see also APPLICATION INFORMATION circuit diagram on page 5.

- | | |
|--------------------------------------|---|
| 1. Output load resistor (red signal) | 9. Blue channel feedback |
| 2. R-Y input signal | 10. Blue signal output |
| 3. G-Y input signal | 11. Output load resistor (blue signal) |
| 4. B-Y input signal | 12. Green channel feedback |
| 5. Luminance signal input | 13. Green signal output |
| 6. Earth (negative supply) | 14. Output load resistor (green signal) |
| 7. Current feed point | 15. Red channel feedback |
| 8. 12 V positive supply | 16. Red signal output |

APPLICATION INFORMATION



APPLICATION INFORMATION (continued)

The function is quoted against the corresponding pin numbering (see also page 5)

1. Output load resistor, red signal (pin 11: blue signal, pin 14: green signal)
Resistors (47 k Ω , 1 W) connected to +200 V provide the high value loads for the internal amplifying stages. The nominal operating potential on these pins is defined by an internal zener type junction and the d.c. feedback and is approximately +8 V. The maximum current which can be allowed at each of these pins is 10 mA.
2. R-Y input signal
This signal is fed via a low-pass filter from the TBA520 demodulator i.c. (pin 7) having a d.c. level of +7.5 V and an amplitude of 1.40 V peak to peak. The input resistance for this pin is typically 60 k Ω with an input capacitance of less than 3 pF (similarly for pins 3 and 4).
3. G-Y input signal
The d.c. black level of this signal is +7.5 V and its amplitude is 0.82 V peak to peak (see pin 2).
4. B-Y input signal
The d.c. black level of this signal is +7.5 V and its amplitude is 1.78 V peak to peak (see pin 2)
5. Luminance signal input
The d.c. level on this pin for picture black is +1.5 V. The required signal amplitude is 1 V black-to-white with negative-going sync (or blanking) for cathode drive as shown. The input resistance at this pin is 20 k Ω approximately with a capacitance of typ. 10 pF.
6. Negative supply (earth)
7. Current feed point
A current of approximately 2.5 mA is required at this pin, fed via a 3.9 k Ω resistor from +12 V, to bias the internal differential amplifiers. A decoupling capacitor of 4.7 nF is necessary.
8. Positive 12 V supply
Maximum supply voltage permitted, 13.2 V. Current consumption approximately 30 mA.
9. Blue channel feedback (green channel, pin 12: red channel, pin 15)
The d.c. working points and gains of both the output stages and the i.c. amplifier stages are stabilised by the feedback circuits. The black level potentials at the collectors of the output stages (tube cut-off) are adjusted by setting correctly the d.c. level of the colour difference signals produced by the TBA520 demodulator i.c. The gains of the R-G-B output stages are adjusted to give the correct white points setting on the picture tube by adjusting the potentiometers in the feedback paths (VR1, VR2). (See notes on setting up decoder).

APPLICATION INFORMATION (continued)

10. Blue signal output (green and red signal outputs on 13 and 16)
These pins are internally connected with pins 11, 14 and 1 respectively via zener type junctions to give a d.c. level shift appropriate for driving the output transistor bases directly. To by-pass the zener junctions at h.f. three 10 nF capacitors are required.
11. Output load resistor, blue channel (pin 1).
12. Green channel feedback (see pin 9).
13. Green signal output (see pin 10).
14. Output load resistor, green channel (see pin 1).
15. Red channel feedback (see pin 9).
16. Red signal output (see pin 10).

BRIEF PERFORMANCE DETAILS AND COMMENTS

1. Spread of the ratio of voltage gains for colour difference and luminance signal inputs 0.9 to 1.1.
2. Very careful attention to earth paths should be given, avoiding common impedances between the input (decoder) side and the output stages. Also, to enable matched performance to be achieved, a symmetrical board and component layout should be adopted for the three output stages. To compensate for the effect upon h.f. response of inevitable differences, e.g., the absence of a potentiometer in one of the stages, the compensating capacitors C₁, C₂ and C₃ may be appropriately selected for any given board layout.
3. The signal black level at the collectors of the R-G-B output stages depends upon the +12V supply, the d.c. level of the colour difference signals from the TBA520 demodulator i.c. and the black level potential of the luminance signal applied to the TBA530 matrix i.c. The d.c. levels of the signals produced and handled by the i.c.'s are designed to have approximately proportional tracking with the 12V supply potential,

$$\text{i.e., } \frac{\Delta V_{\text{(d.c. level, signal)}}}{\Delta V_{12V}} \approx \frac{V_{\text{nom(d.c. level, signal)}}}{12}$$

To ensure that changes in picture black level due to variations on the 12V supply to the i.c.'s occur in a predictable way, all the i.c.'s should be operated from a common supply line. This is specially important for the TBA520 and TBA530. Furthermore, to limit the changes in picture black level during receiver operation, the 12V supply should have a stability of not worse than ±3% due to operational variations, and preferably be tracked with the screen-grid supply of the picture tube.