

## VIDEO PROCESSOR AND FREQUENCY MODULATOR FOR VIDEO RECORDERS

### GENERAL DESCRIPTION

The TDA3740 is a monolithic integrated circuit for video signal processing and frequency modulation in video recorders.

### Features

- Video controlled amplifier with clamping stage
- Fast and slow white amplitude detector
- Sync amplitude detector
- Black and white clip
- Insertion of sync and composite video signals
- Adder stage for composite video and chrominance signals
- Two-stage amplification for the composite video signal with dynamic (adjustable) and linear pre-emphasis
- White clip with external determination of clipping level
- Voltage controlled oscillator (frequency modulator)
- Blanking stage for the voltage controlled oscillator and limiter amplifier
- Reference voltage source

### QUICK REFERENCE DATA

|                                                              |                       |      |        |
|--------------------------------------------------------------|-----------------------|------|--------|
| Supply voltage (pin 18, 28)                                  | $V_P = V_{18, 28-27}$ | typ. | 10 V   |
| Supply current (pin 18, 28) (record mode)                    | $I_P = I_{18, 28}$    | typ. | 58 mA  |
| Supply current (pin 18) (playback mode)                      | $I_P = I_{18}$        | typ. | 28 mA  |
| Composite video input signal<br>(peak-to-peak value)         | $V_{3-27(p-p)}$       | typ. | 350 mV |
| Composite colour video output signal<br>(peak-to-peak value) | $V_{7-27(p-p)}$       | typ. | 2 V    |
| Chrominance input signal<br>(peak-to-peak value)             | $V_{9-27(p-p)}$       | typ. | 240 mV |
| Output current (pin 22, 23)                                  | $I_{22, 23}$          | typ. | 8,5 mA |

### PACKAGE OUTLINE

28-lead DIL; plastic (SOT117).

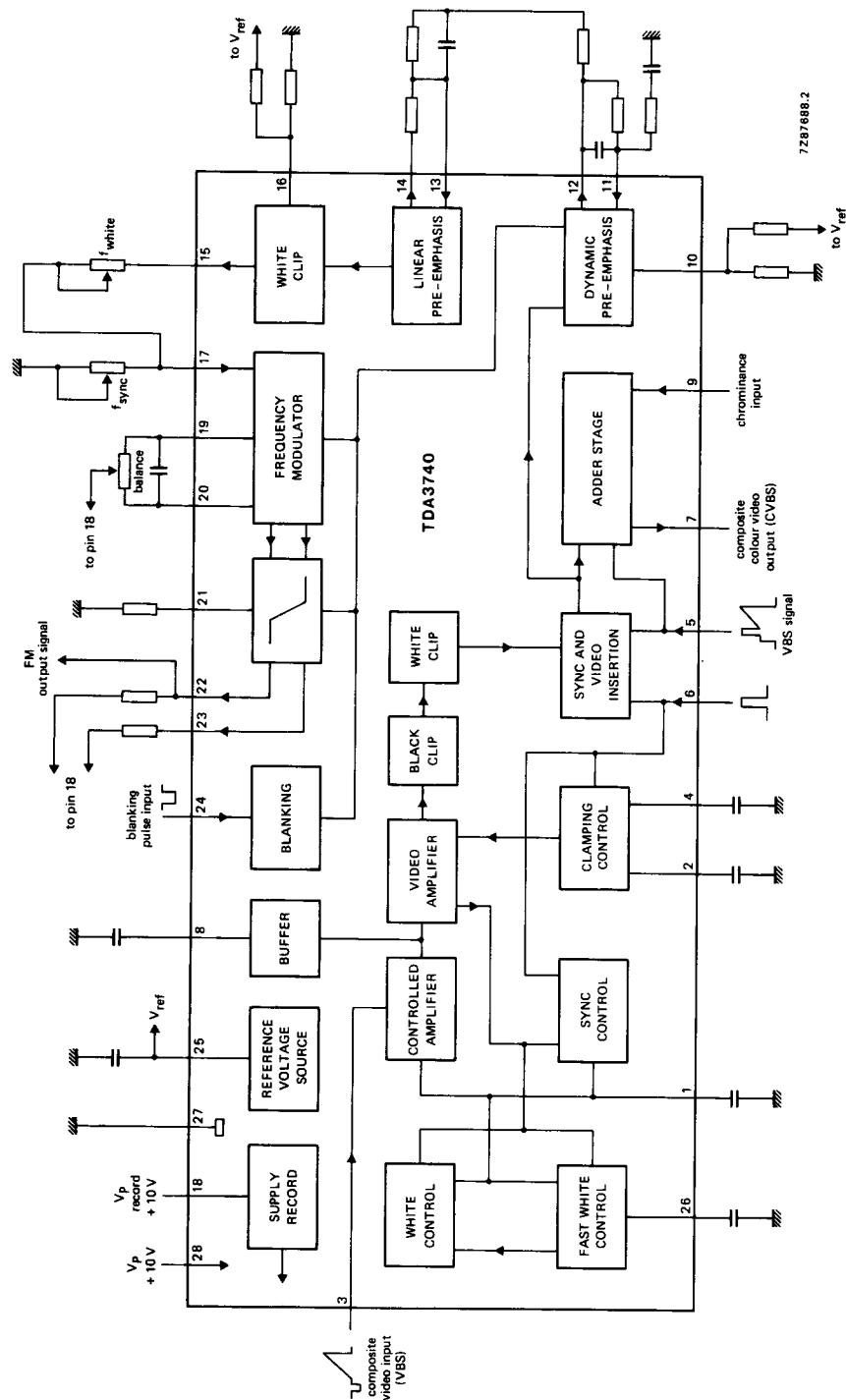


Fig. 1 Block diagram.

**RATINGS**

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

Supply voltage (pin 18, 28)  $V_P = V_{18, 28-27}$  max. 13,2 VWith pin 27 connected to ground and pin 18 and 28 to supply voltage ( $V_P$ ) all voltages between 0 and  $V_P$  are allowed.Total power dissipation  $P_{tot}$  max. 1,4 WStorage temperature range  $T_{stg}$  -25 to +150 °COperating ambient temperature range  $T_{amb}$  0 to +70 °C**CHARACTERISTICS** $V_P = V_{18-28} = 10$  V;  $T_{amb} = 25$  °C; measured in test circuit Fig. 2; unless otherwise specified

| parameter                                                                   | symbol                | min. | typ. | max. | unit |
|-----------------------------------------------------------------------------|-----------------------|------|------|------|------|
| <b>Supply</b> (pin 18, 28)                                                  |                       |      |      |      |      |
| Supply voltage                                                              | $V_P = V_{18, 28-27}$ | 9    | 10   | 13,2 | V    |
| Supply current                                                              |                       |      |      |      |      |
| at record (FM kill inactive)                                                | $I_P = I_{18, 28}$    | —    | 58   | —    | mA   |
| at playback                                                                 | $I_P = I_{28}$        | —    | 28   | —    | mA   |
| <b>Controlled amplifier</b>                                                 |                       |      |      |      |      |
| Composite video input signal<br>(peak-to-peak value)                        | $V_{3-27(p-p)}$       | 0,20 | 0,35 | 0,62 | V    |
| Video signal control range<br>(referred to 0,35 V input signal<br>at pin 3) | $\alpha_{3-27}$       | ±5   | ±6   | —    | dB   |
| Input resistance                                                            | $R_{3-27}$            | 7    | 10   | 13   | kΩ   |
| Input capacitance                                                           | $C_{3-27}$            | —    | —    | 10   | pF   |
| Composite colour video output signal<br>(peak-to-peak value)                | $V_{7-27(p-p)}$       | 1,9  | 2    | 2,1  | V    |
| Frequency response (0 to 3 MHz)                                             | $\alpha_{7-3}$        | -0,5 | —    | 0,5  | dB   |
| <b>Sync recovering and insertion of composite<br/>video signal</b>          |                       |      |      |      |      |
| Threshold voltage for sync recovering                                       | $V_{6-27}$            | 3,0  | 3,5  | 4,0  | V    |
| Input resistance                                                            | $R_{6-27}$            | 100  | —    | —    | kΩ   |

DEVELOPMENT DATA

| parameter                                                                  | symbol          | min. | typ. | max. | unit       |
|----------------------------------------------------------------------------|-----------------|------|------|------|------------|
| <b>Insertion of composite video signal</b>                                 |                 |      |      |      |            |
| insertion inactive                                                         | V5-27           | 0    | —    | 0,9  | V          |
| video + chroma mute                                                        | V5-27           | 2,5  | —    | 3,0  | V          |
| insertion black level                                                      | V5-27           | 3,1  | 3,25 | 3,4  | V          |
| insertion white level (90% CVBS)                                           | V5-27           | 3,7  | 4,0  | 4,3  | V          |
| Input resistance                                                           | V5-27           | 100  | —    | —    | k $\Omega$ |
| Gain                                                                       | G7-5            | 2,9  | 4,5  | 6,5  | dB         |
| Frequency response (0 to 5 MHz)                                            | $\alpha$ 7-5    | —    | —    | 3    | dB         |
| Signal suppression pin 7 at mute                                           |                 | -40  | —    | —    | dB         |
| <b>Clamping control</b>                                                    |                 |      |      |      |            |
| Duration of clamping pulse (note 1)<br>with C2-27 = 100 nF; C4-27 = 2,2 nF | t <sub>d</sub>  | 1    | 3    | 4,5  | $\mu$ s    |
| Max. leakage current of external<br>capacitor                              | I <sub>L2</sub> | —    | —    | 1    | $\mu$ A    |
| <b>Black and white clip</b>                                                |                 |      |      |      |            |
| Black clip relative to black level                                         | $\Delta$ V7-27  | -40  | -25  | 0    | mV         |
| White clip at pin 7<br>(referred to nominal VBS)                           |                 | 103  | 105  | 107  | %          |
| <b>Chrominance signal adder and output stage</b>                           |                 |      |      |      |            |
| Burst input signal<br>(peak-to-peak value)                                 | V9-27(p-p)      | —    | 240  | 400  | mV         |
| Input resistance                                                           | R9-27           | 4    | 5,6  | —    | k $\Omega$ |
| D.C. level of top sync                                                     | V7-27           | 2,4  | 2,7  | 3,0  | V          |
| Sync amplitude at CVBS output pin 7                                        | V7-27(p-p)      | 570  | 600  | 630  | mV         |
| Gain (f = 4,43 MHz)                                                        | G7-9            | 7    | 8    | 9    | dB         |
| Output resistance                                                          | R7-27           | —    | —    | 30   | $\Omega$   |
| Frequency response (0 to 5 MHz)                                            | $\alpha$ 7-9    | -0,5 | —    | +0,5 | dB         |
| <b>Dynamic and linear pre-emphasis; white limiter</b>                      |                 |      |      |      |            |
| Input resistance pin 11                                                    | R11-27          | 15   | —    | —    | k $\Omega$ |
| Output resistance (emitter follower with<br>internal current source)       | R12-27          | —    | —    | 30   | $\Omega$   |
| Gain-bandwidth product<br>dynamic (V <sub>24-27</sub> = V <sub>p</sub> )   |                 | 24   | 36   | —    | MHz        |
| linear                                                                     |                 | 30   | —    | —    | MHz        |

| parameter                                                                             | symbol                                   | min. | typ. | max. | unit                             |
|---------------------------------------------------------------------------------------|------------------------------------------|------|------|------|----------------------------------|
| Range of dynamic pre-emphasis<br>(fixed by external resistors at pin 10)              | V10-27                                   | 0    | —    | 2,5  | V                                |
| Gain adjustment range at 1 MHz and<br>V7-27 = 632 mV                                  | G12-7                                    | 1,5  | —    | 8    | dB                               |
| Output resistance (emitter follower with<br>internal current source)                  | R14-27                                   | —    | —    | 30   | $\Omega$                         |
| White clip level deviation relative to<br>V16-27 = 1,5 V                              | V16-15                                   | 75   | —    | 125  | mV                               |
| Range of clipping determination<br>(note 2)                                           | V16-27                                   | 1    | —    | 3    | V                                |
| <b>Frequency modulator</b>                                                            |                                          |      |      |      |                                  |
| D.C. level at pin 21 (note 3)                                                         | V21-27                                   | 1,8  | 1,9  | 2,0  | V                                |
| FM output voltage (note 3)<br>R21-27 = 1,5 k $\Omega$ , R22, 23-18 = 470 $\Omega$     | V22, 23-27                               | —    | 660  | —    | mV                               |
| Slope between 3 MHz and 6 MHz                                                         | $\frac{\Delta f_{22,23}}{\Delta I_{17}}$ | —    | 10,5 | —    | $\frac{\text{KHz}}{\mu\text{A}}$ |
|                                                                                       | m                                        | 95   | —    | —    | %                                |
| Linearity between 3 MHz and 6 MHz                                                     |                                          |      |      |      |                                  |
| Suppression of the 2nd harmonic<br>referred to the 1st harmonic 3,8 MHz<br>(balanced) | $\alpha_{\text{harm}}$                   | 40   | 46   | —    | dB                               |
| Frequency drift dependent on:<br>drift of supply voltage (Vp = 9 – 13,2 V)            | $\frac{\Delta f_{22,23}}{\Delta V_p}$    | —    | 5    | 10   | $\frac{\text{KHz}}{\text{V}}$    |
| drift of ambient temperature<br>(Tamb = 0 – 70 °C) at 3,8 MHz                         | $\Delta f_{22,23}$                       | –85  | —    | +85  | KHz                              |
| at 4,8 MHz                                                                            | $\Delta f_{22,23}$                       | –85  | —    | +85  | KHz                              |
| Drift of frequency span dependent<br>on temperature drift (Tamb = 0 – 70 °C)          | $\Delta f$                               | –70  | —    | +70  | KHz                              |
| Input voltage to switch FM off                                                        | V24-27                                   | —    | —    | 2    | V                                |
| Input voltage to switch FM on                                                         | V24-27                                   | 3    | —    | —    | V                                |
| Input resistance                                                                      | R24-27                                   | 10   | —    | —    | k $\Omega$                       |

| parameter                                                                          | symbol                                | min. | typ. | max. | unit           |
|------------------------------------------------------------------------------------|---------------------------------------|------|------|------|----------------|
| <b>Reference voltage source (pin 25)</b>                                           |                                       |      |      |      |                |
| Output voltage                                                                     | $V_{25-27}$                           | —    | 5,5  | —    | V              |
| Output current (additional to application)                                         | $I_{25}$                              | —3   | —    | +5   | mA             |
| Output voltage drift dependent on<br>drift of supply voltage ( $V_P = 9 - 13,2$ V) | $\frac{\Delta V_{25-27}}{\Delta V_P}$ | —10  | —    | +10  | $\frac{mV}{V}$ |
| drift of ambient temperature<br>( $T_{amb} = 0 - 70$ °C)                           | $\Delta V_{25-27}$                    | —90  | —    | +90  | mV             |

**Notes**

1. Duration of clamping pulse is determined by C4-27 as follows:  $t_d (\mu s) = 1,364 \cdot C_{4-27} (nF)$ .
2. White clipping level is fixed by the external resistors at pin 16, e.g.  $R_{16-25} = 3,3 k\Omega$  and  $R_{16-27} = 2 k\Omega$  results in 160% clipping level.
3. FM output amplitude at pins 22 and 23 is determined by the external fixed resistors  $R_{21-27}$ ,  $R_{22-18}$  and  $R_{23-18}$ .

## DEVELOPMENT DATA

## APPLICATION INFORMATION

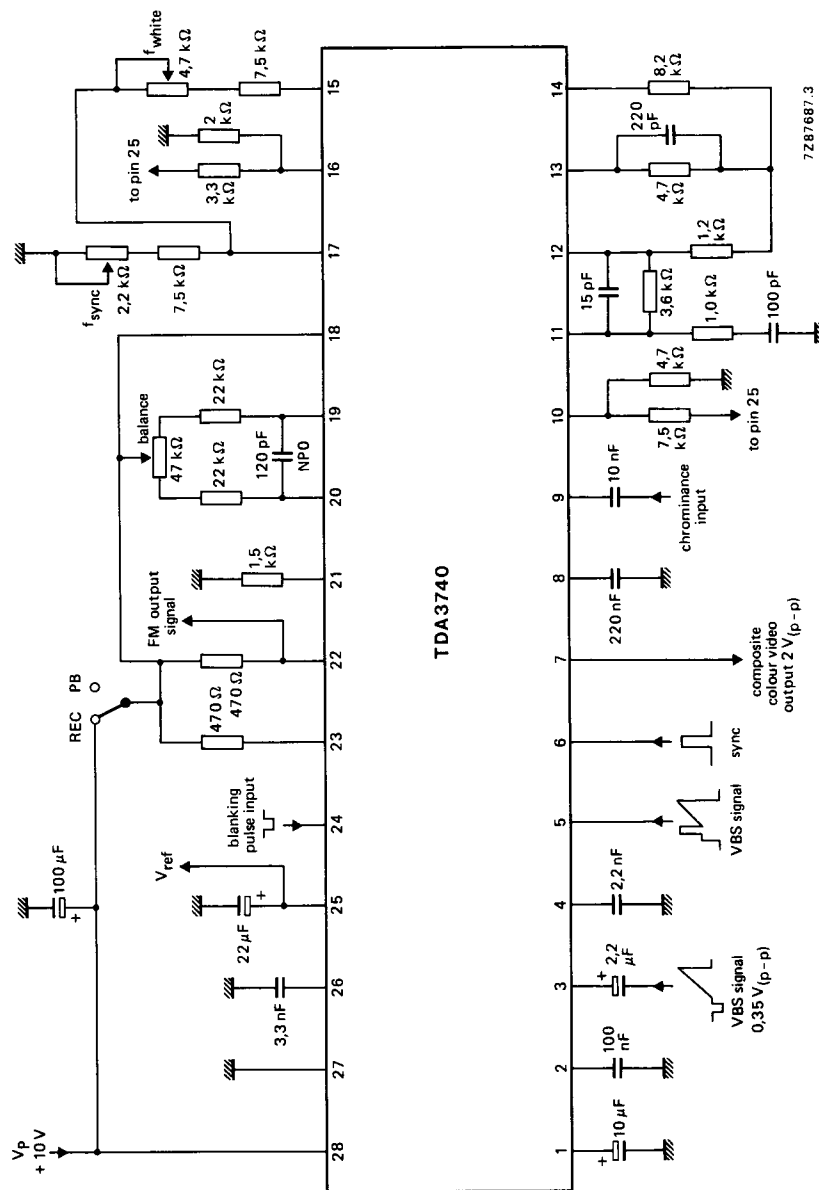


Fig. 2 Application diagram; also used as test circuit.

REC = record.  
PB = playback.