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 (peak-to-peak value)	$V_{3-27(p-p)}$	typ.	350 mV
Composite colour video output signal (peak-to-peak value)	$V_{7-27(p-p)}$	typ.	2 V
Chrominance input signal (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).

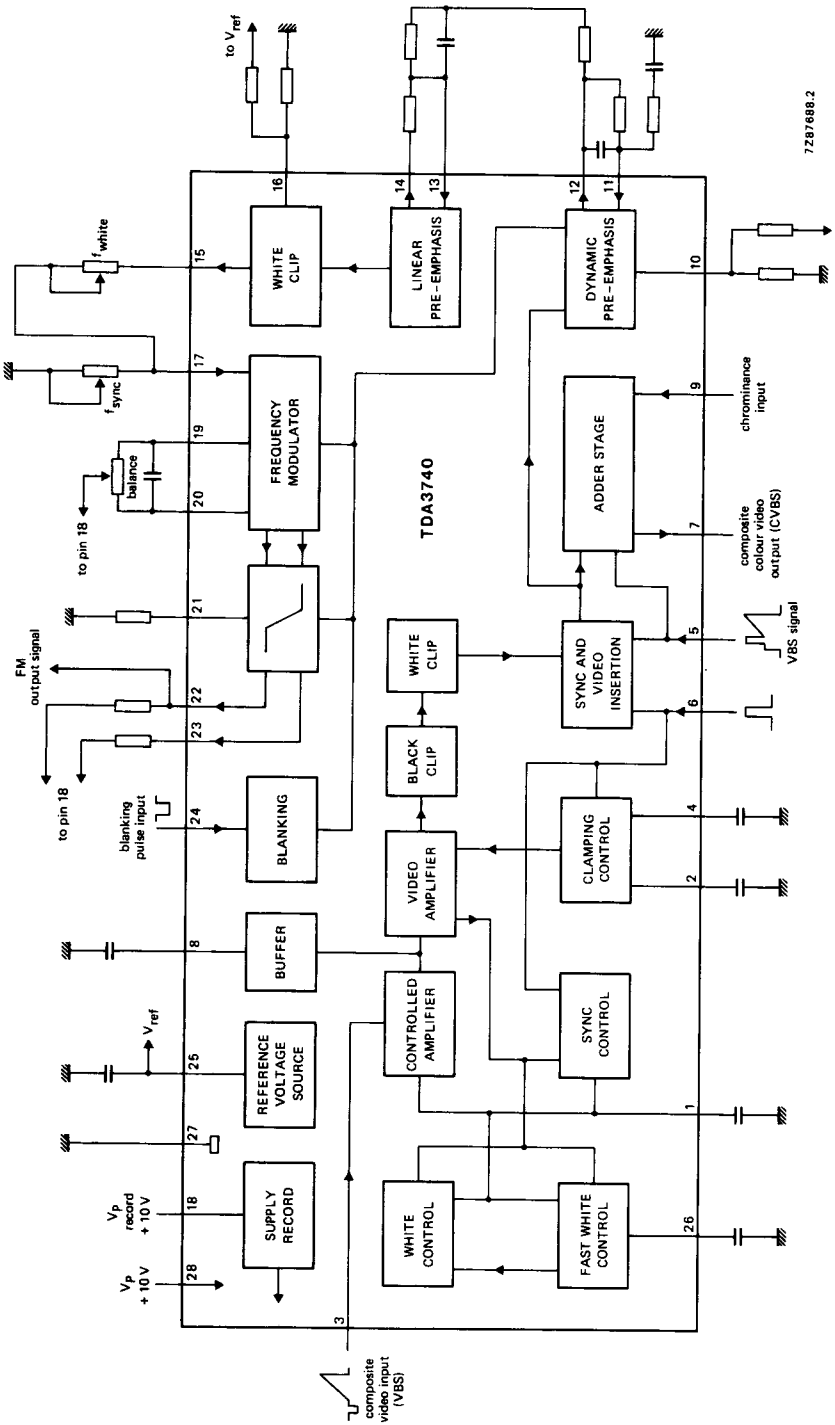


Fig. 1 Block diagram.

RATINGS

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

Supply voltage (pin 18, 28)	$V_P = V_{18,\,28\text{-}27}$	max.	13,2	V

With 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	W
Storage temperature range	T_{stg}		−25 to +150	°C
Operating ambient temperature range	T_{amb}		0 to +70	°C

CHARACTERISTICS

$V_P = V_{18\text{-}28} = 10$ V; $T_{amb} = 25$ °C; measured in test circuit Fig. 2; unless otherwise specified

parameter	symbol	min.	typ.	max.	unit
Supply (pin 18, 28)					
Supply voltage	$V_P = V_{18,\,28\text{-}27}$	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
Controlled amplifier					
Composite video input signal (peak-to-peak value)	$V_{3\text{-}27(p\text{-}p)}$	0,20	0,35	0,62	V
Video signal control range (referred to 0,35 V input signal at pin 3)	$\alpha_{3\text{-}27}$	±5	±6	–	dB
Input resistance	$R_{3\text{-}27}$	7	10	13	kΩ
Input capacitance	$C_{3\text{-}27}$	–	–	10	pF
Composite colour video output signal (peak-to-peak value)	$V_{7\text{-}27(p\text{-}p)}$	1,9	2	2,1	V
Frequency response (0 to 3 MHz)	$\alpha_{7\text{-}3}$	−0,5	–	0,5	dB
Sync recovering and insertion of composite video signal					
Threshold voltage for sync recovering	$V_{6\text{-}27}$	3,0	3,5	4,0	V
Input resistance	$R_{6\text{-}27}$	100	–	–	kΩ

DEVELOPMENT DATA

parameter	symbol	min.	typ.	max.	unit
Insertion of composite video signal					
insertion inactive	V_{5-27}	0	–	0,9	V
video + chroma mute	V_{5-27}	2,5	–	3,0	V
insertion black level	V_{5-27}	3,1	3,25	3,4	V
insertion white level (90% CVBS)	V_{5-27}	3,7	4,0	4,3	V
Input resistance	V_{5-27}	100	–	–	kΩ
Gain	G_{7-5}	2,9	4,5	6,5	dB
Frequency response (0 to 5 MHz)	α_{7-5}	–	–	3	dB
Signal suppression pin 7 at mute		−40	–	–	dB
Clamping control					
Duration of clamping pulse (note 1) with C_{2-27} = 100 nF; C_{4-27} = 2,2 nF	t_d	1	3	4,5	μs
Max. leakage current of external capacitor	I_{L2}	–	–	1	μA
Black and white clip					
Black clip relative to black level	ΔV_{7-27}	−40	−25	0	mV
White clip at pin 7 (referred to nominal VBS)		103	105	107	%
Chrominance signal adder and output stage					
Burst input signal (peak-to-peak value)	$V_{9-27(p-p)}$	–	240	400	mV
Input resistance	R_{9-27}	4	5,6	–	kΩ
D.C. level of top sync	V_{7-27}	2,4	2,7	3,0	V
Sync amplitude at CVBS output pin 7	$V_{7-27(p-p)}$	570	600	630	mV
Gain (f = 4,43 MHz)	G_{7-9}	7	8	9	dB
Output resistance	R_{7-27}	–	–	30	Ω
Frequency response (0 to 5 MHz)	α_{7-9}	−0,5	–	+0,5	dB
Dynamic and linear pre-emphasis; white limiter					
Input resistance pin 11	R_{11-27}	15	–	–	kΩ
Output resistance (emitter follower with internal current source)	R_{12-27}	–	–	30	Ω
Gain-bandwidth product					
dynamic (V_{24-27} = Vp)		24	36	–	MHz
linear		30	–	–	MHz

parameter	symbol	min.	typ.	max.	unit
Range of dynamic pre-emphasis (fixed by external resistors at pin 10)	$V_{10\text{-}27}$	0	–	2,5	V
Gain adjustment range at 1 MHz and $V_{7\text{-}27}$ = 632 mV	$G_{12\text{-}7}$	1,5	–	8	dB
Output resistance (emitter follower with internal current source)	$R_{14\text{-}27}$	–	–	30	Ω
White clip level deviation relative to $V_{16\text{-}27}$ = 1,5 V	$V_{16\text{-}15}$	75	–	125	mV
Range of clipping determination (note 2)	$V_{16\text{-}27}$	1	–	3	V
Frequency modulator					
D.C. level at pin 21 (note 3)	$V_{21\text{-}27}$	1,8	1,9	2,0	V
FM output voltage (note 3) $R_{21\text{-}27}$ = 1,5 kΩ, $R_{22,\ 23\text{-}18}$ = 470 Ω	$V_{22,\ 23\text{-}27}$	–	660	–	mV
Slope between 3 MHz and 6 MHz	$\frac{\Delta f_{22,23}}{\Delta I_{17}}$	–	10,5	–	$\frac{\text{KHz}}{\mu\text{A}}$
Linearity between 3 MHz and 6 MHz	m	95	–	–	%
Suppression of the 2nd harmonic referred to the 1st harmonic 3,8 MHz (balanced)	α_{harm}	40	46	–	dB
Frequency drift dependent on: drift of supply voltage (V_P = 9 – 13,2 V)	$\frac{\Delta f_{22,23}}{\Delta V_P}$	–	5	10	$\frac{\text{KHz}}{\text{V}}$
drift of ambient temperature (T_{amb} = 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 on temperature drift (T_{amb} = 0 – 70 °C)	Δf	–70	–	+70	kHz
Input voltage to switch FM off	$V_{24\text{-}27}$	–	–	2	V
Input voltage to switch FM on	$V_{24\text{-}27}$	3	–	–	V
Input resistance	$R_{24\text{-}27}$	10	–	–	kΩ

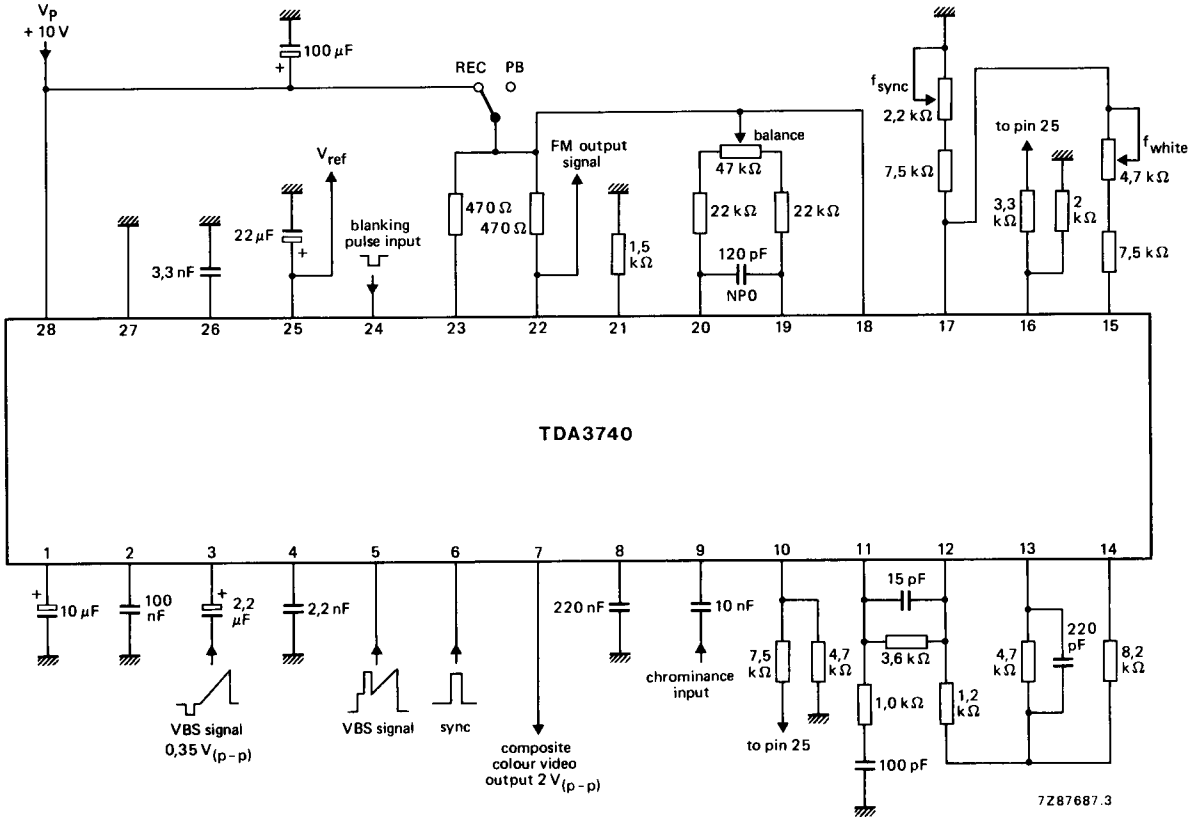
DEVELOPMENT DATA

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

Notes

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

APPLICATION INFORMATION



REC = record.
PB = playback.

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