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TCA800

COLOUR DEMODULATOR WITH FEEDBACK CLAMPS

A monolithic integrated circuit for colour television receivers incorporating two active synchronous demodulators for the F_{B-Y} and $\pm F_{R-Y}$ signals, a G-Y matrix, PAL switch bistable and RGB matrix, suitable for driving simple single transistor video output stages. The circuit incorporates three feedback clamps to stabilise the black level, to eliminate the problem of thermal drift in the demodulators.

OPERATING NOTES

For alternative applications in a simple decoder circuit, it must be possible to trigger the flip-flop so that it runs in the correct ident. phase by means of an AC coupled, 2 volt p-p square wave, derived from the APC loop in the reference generator circuit. (The normal input line timebase pulse would still be applied in order to provide clamp pulses.)

Input impedance of output amplifier (BF337) (Expressed as parallel resistance and capacitance.)

R (typ.) 5kΩ
C (typ.) 80pF

The above values are given for suitable design of output stages i.e. emitter follower with 5mA current capability.

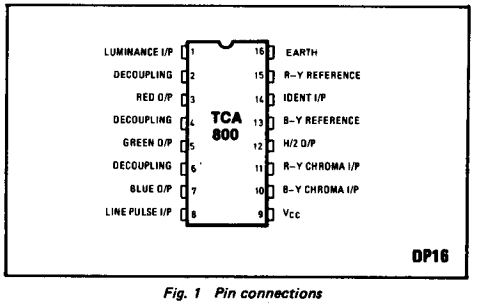

Fig. 1 Pin connections

QUICK REFERENCE DATA

V_{supply} -(Nominal) 12V
I_{supply} -(Nominal) (I_8 = 0.5mA) 47mA
Voltage Gain of Chrominance (R-Y) Signal Channel (typ.) $V_{in(p-p)}$ = 50mV; f = 4.43MHz; Video Gain = X20 17.5V/V
Voltage Gain of Luminance (Y) Channel V_{in} (Black-to-White) = 1V (p-p) 5V/V
Operating Temperature Range −10 to +55°C

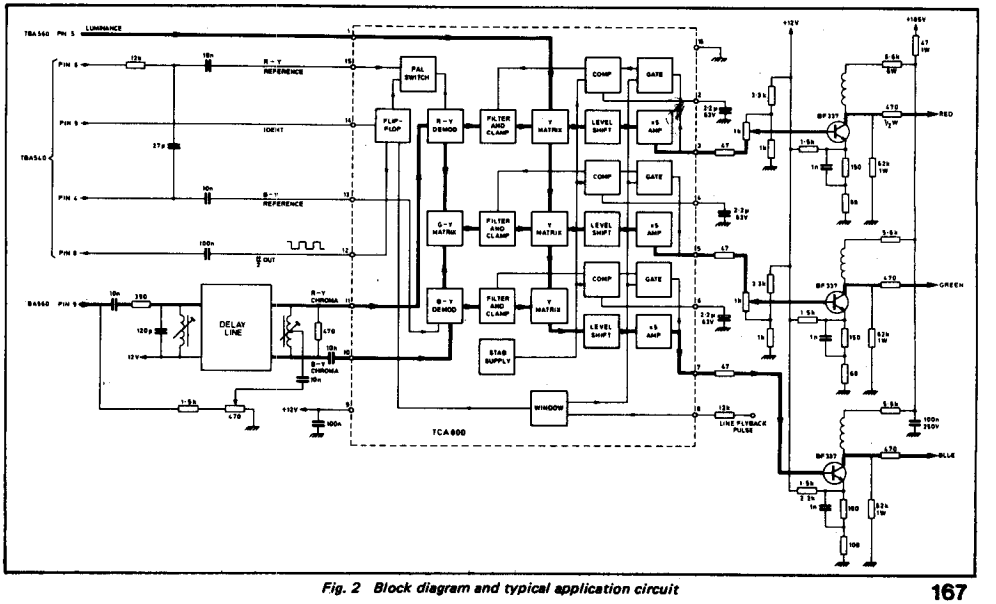

Fig. 2 Block diagram and typical application circuit

ELECTRICAL CHARACTERISTICS

Test Conditions (unless otherwise stated):

T_{amb} = +25°C, V_{CC} = +12V

Characteristic	Pin	Value			Units	Conditions
		Min.	Typ.	Max.		
Supply voltage range	9	10.8	12	13.2	V	
Voltage gain of chrominance (R-Y) signal channel			17.5		V/V	$V_{in\ p\text{-}p}$ = 50mV, f = 4.43MHz, video gain = X20
Voltage gain of luminance (Y) channels			5		V/V	$V_{in\ (black\text{-}to\text{-}white)}$ = 1V p-p
Bandwidth (−3dB) of luminance channel from Y input to R-G-B outputs			10		MHz	
Bandwidth (−3dB) of chroma channel from $F_{(R\text{-}Y)}$, $F_{(B\text{-}Y)}$ inputs to R-G-B outputs			1		MHz	
Ratio of demodulated signals						
$V_{(B\text{-}Y)}/V_{(R\text{-}Y)}$		1.60	1.78	1.96		Defined with equal chroma input signals
$V_{(G\text{-}Y)}/V_{(R\text{-}Y)}$		0.76	0.85	0.94		and measured at output pins (see note 1)
Input Characteristics						
Chrominance input impedance (expressed as resistance and parallel capacitance	10, 11					
R			1000		Ω	f = 4.43MHz, V_{in} = 20mV sinewave
C				10	pF	
Luminance (Y) input blanking level (fixed by TBA560)	1	1.4	1.5	1.8	V	
Luminance (Y) input, black level potential (nominal brightness set by brightness control of TBA560)	1		1.7		V	
Luminance (Y) input black-to-white amplitude (adjusted by contrast control of TBA560)	1		1.0		Vp-p	
Reference input impedance (expressed as resistance and parallel capacitance)	13, 15					
R			5.0		kΩ	f = 4.43MHz
C			5.0	10	pF	
Reference input voltage (from TBA540)	13, 15	0.5	1.0	2.0	V p-p	
Phase shift between reference inputs and chroma input signal to give coincidence at the synchronous demodulators	13, 15		10		degrees	
Ident. voltage for ident 'off'	14	+6			V	
Ident. voltage for ident 'on'	14			+7.0	V	
Ident. current for ident 'off'	14			0.1	mA	
Tracking of ident. threshold with a supply variation of ±10% $\frac{\Delta V_{threshold} \cdot V_{CC}}{V_{threshold} \cdot \Delta V_{CC}}$	14		1.0			
Required line pulse input current to clamps and H/2 flip-flop	8	0.3	0.45	0.6	mA	
Window level (see note 2)	8		+12.5		V	
Line input impedance	8	0.6	1.0	1.4	kΩ	
Output Characteristics						
R-G-B outputs blanking level	3, 5, 7		2.0		V DC	Blanking level at pin 1 = 1.5V
Common mode variation of black level variation over a temperature range of 40°C		See note 3				
Blanking-to-white level output voltage capability of each output amplifier channel	3, 5, 7	6		8	V p-p	

Characteristic	Pin	Value			Units	Conditions
		Min.	Typ.	Max.		
Difference in clamped blanking level of outputs i.e., R to G to B	3,5,7			50	mV	
Differential drift of clamped output blanking levels over temperature range of 40°C	3, 5, 7			25	mV	
Residual 4.43MHz signal at R-G-B outputs						
Red				150	mV p-p	
Blue				300	mV p-p	
H/2 square wave output amplitude	12	2.5	3.5		V p-p	Measured with 3kΩ load i.e. TBA540

NOTES

1. These values are chosen to minimise errors in flesh tones and of the luminance of the green component. The matrix equation for the derivation of the G-Y component is given by G-Y = −0.51(R-Y) −0.19(B-Y). (This is derived from the basic colour equation Y = 0.30R + 0.59G +0.11B.) Measured at the tube cathodes with 100V p-p video drive.
2. In order to provide a clamp pulse which occurs inside the blanking waveform and free from the edge spikes, it is necessary to window the line pulse at about two thirds of its amplitude.
3. In order to partially compensate for drift in output stages a negative temperature coefficient to compensate for the variation in the video output transistor has been incorporated.

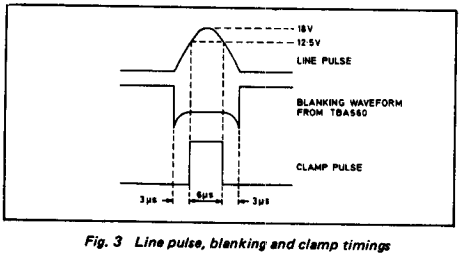

Fig. 3 Line pulse, blanking and clamp timings

ABSOLUTE MAXIMUM RATING

Max. dissipation @ +55°C = 900mW
Storage temperature range −55°C to +125°C