Signetics

TDA4570
NTSC Color Difference Decoder

Product Specification

Linear Products

DESCRIPTION

The TDA4570 is a monolithic, integrated NTSC decoder for NTSC television receivers, which is decoder for NTSC television receivers, which is pin-sequence compatible with multistandard decoder TDA4555.

It can be used in applications with 3.58MHz subcarrier frequency as well as in applications with 4.43MHz subcarrier frequency.

FEATURES

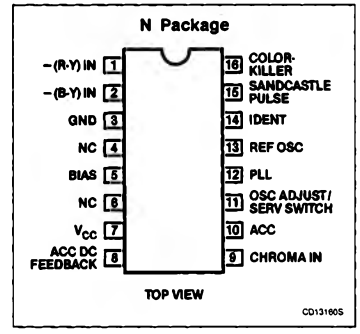
Chrominance part:

- **Gain-controlled amplifier with operating point control stage**
- **ACC (automatic chrominance control) with sampled rectifier during burst-key**
- **Blanking circuit for the color burst signal**
- **Voltage-controlled reference oscillator for double subcarrier frequency**
- **Divider stages which provide −(R-Y) and −(B-Y) reference signals with the correct 90° phase relation for the demodulators**
- **Phase comparator, which compares the −(R-Y) reference signal with the burst pulse and controls the frequency and phase of the reference oscillator**
- **Hue-control stage for phase-shifting via the combined service and hue-control input Pin 11**
- **Identification demodulator, which delivers a positive-going identification signal for NTSC signals at Pin 14; also used for the automatic color-killer**
- **Service switch with two functions. The first position ($V_{14-3} < 1V$) allows the adjustment of the reference oscillator; therefore, the color is switched on, the hue-control and the burst for the oscillator PLL is switched off. The second position ($V_{14-3} > 5V$) switches the color on, the hue-control is switched off, and the output signals can be observed**
- **Sandcastle pulse detector for burst gate, −line and +line vertical blanking pulse detection; the vertical part of the sandcastle pulse is needed for the internal color-on and color-off delay**
- **Pulse processing part which shall prevent a premature switching on of the color; the color-on delay, two or three field periods after identification of the NTSC signal, is achieved by a counter. The color is switched off immediately, or, at the latest, one field period after disappearance of the identification voltage**

Demodulator part:

- **Two synchronous demodulators for the (B-Y) and (R-Y) signals, which incorporate stages for blanking during line- and field-flyback**
- **Internal filtering of the residual carrier in the demodulated color difference signals**
- **Color switching stages controlled by the pulse processing part in front of the output stages**

PIN CONFIGURATION



- **−(B-Y) and −(R-Y) signal output stages; the output stages are low-resistance NPN emitter-followers**
- **Separate color switching output**

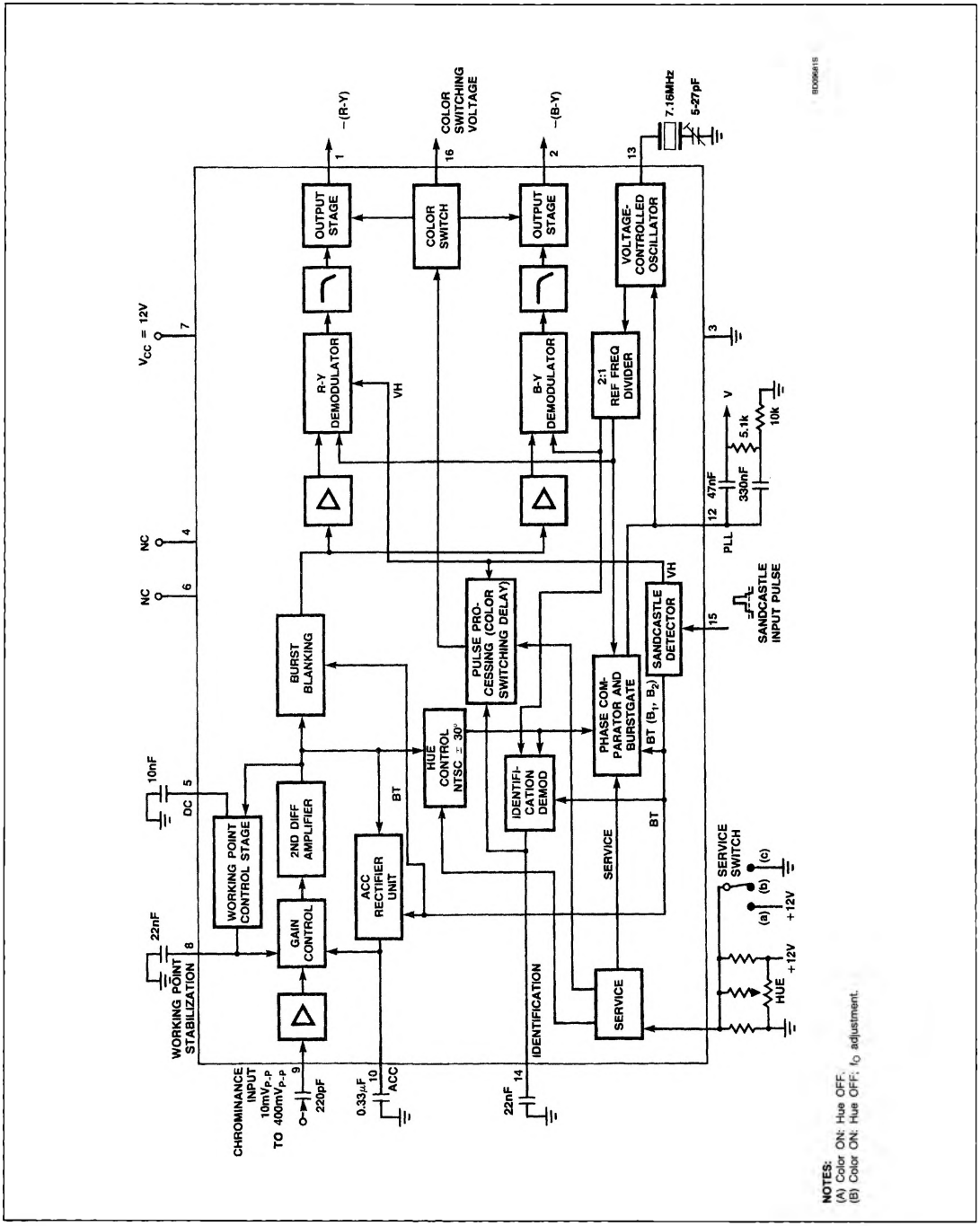
APPLICATIONS

- **Video processing**
- **TV receivers**
- **Graphic systems**

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
16-Pin Plastic DIP (SOT-38)	0 to +70°C	TDA4570N

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
$V_{CC} = V_{7-3}$	Supply voltage range	10.8 to 13.2	V
	Currents		
$-I_{1,2}$	at Pins 1 and 2	5	mA
$-I_{16}$	at Pin 16	5	mA
θ_{JA}	Thermal resistance	80	°C/W
P_{TOT}	Total power dissipation	800	mW
T_{STG}	Storage temperature range	−65 to +150	°C
T_A	Operating ambient temperature range	0 to +70	°C

DC ELECTRICAL CHARACTERISTICS V_{CC} = 12V; T_A = 25°C; measured in Figure 1, unless otherwise specified.

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Typ	Max	
I_7	Supply current		50		mA
Chrominance part					
$V_{9-3(P-P)}$	Input voltage range (peak-to-peak value)	10		400	mV
$V_{9-3(P-P)}$	Nominal input voltage (peak-to-peak values) with 75% color bar signal		100		mV
Z_{9-3}	Input impedance		3.3		kΩ
C_{9-3}	Input capacitance		4		pF
Oscillator and control voltage part					
f_O	Oscillator frequency for subcarrier frequency of 3.58MHz		7.16		MHz
R_{13-3}	Input resistance		350		Ω
Δf	Catching range (depending on RC network between Pins 12 and 3)	±300			Hz
	Control voltage				
V_{14-3}	without burst signal		6		V
V_{14-3}	color switching threshold		6.6		V
V_{14-3}	hysteresis of color switching		150		mV
t_D ON	Color-on delay			3	Field period
t_D OFF	Color-off delay			1	Field period
	Color-switching output (open NPN emitter)				
$-I_{16}$	output current			5	mA
V_{16-3}	color-on voltage		6		V
V_{16-3}	color-off voltage		0		V
Hue control and service switches					
ϕ	Phase shift of reference carrier relative to the input signal V_{11-3} = 3V	−5	0	5	Degree
	Phase shift of reference carrier relative to phase				
$-\phi$	at V_{11-3} = 3V V_{11-3} = 2V	30			Degree
ϕ	V_{11-3} = 4V	30			Degree
	Internal source (open pin)		3		V
V_{11-3}	First service position (PLL is inactive for oscillator adjustment, color ON, hue OFF)	0		1	V
V_{11-3}	Second service position (color ON; hue OFF)	5		V_{CC}	V

DC ELECTRICAL CHARACTERISTICS (Continued) V_{CC} = 12V; T_A = 25°C; measured in Figure 1, unless otherwise specified.

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Typ	Max	
Demodulator part					
	Color difference output signals (peak-to-peak value)				
$V_{1-3(P-P)}$	– (R-Y) signal	0.84	1.05	1.32	V
$V_{2-3(P-P)}$	– (B-Y) signal	1.06	1.33	1.67	V
$\frac{V_{1-3}}{V_{2-3}}$	Ratio of color difference output signals (R-Y)/(B-Y)	0.71	0.79	0.87	
$V_{1,\,2-3}$	DC voltage at color difference outputs		7.7		V
	Residual carrier at color difference outputs				
$V_{1,\,2-3(P-P)}$	(1 × subcarrier frequency)			20	mV
$V_{1,\,2-3(P-P)}$	(2 × subcarrier frequency)			30	mV
Sandcastle pulse detector					
The sandcastle pulse is compared to three internal threshold levels, which are proportional to the supply voltage.					
	Thresholds:				
V_{15-3}	Field- and line-pulse separation; pulse on	1.3	1.6	1.9	V
$V_{15-3(P-P)}$	Required pulse amplitude	2	2.5	3	V
V_{15-3}	Line-pulse separation; pulse on	3.3	3.6	3.9	V
$V_{15-3(P-P)}$	Required pulse amplitude	4.1	4.5	4.9	V
V_{15-3}	Burst-pulse separation; pulse on	6.6	7.1	7.6	V
$V_{15-3(P-P)}$	Required pulse amplitude	7.7			V
V_{15-3}	Input voltage during horizontal scanning			1.1	V
$-I_{15}$	Input current			100	μA

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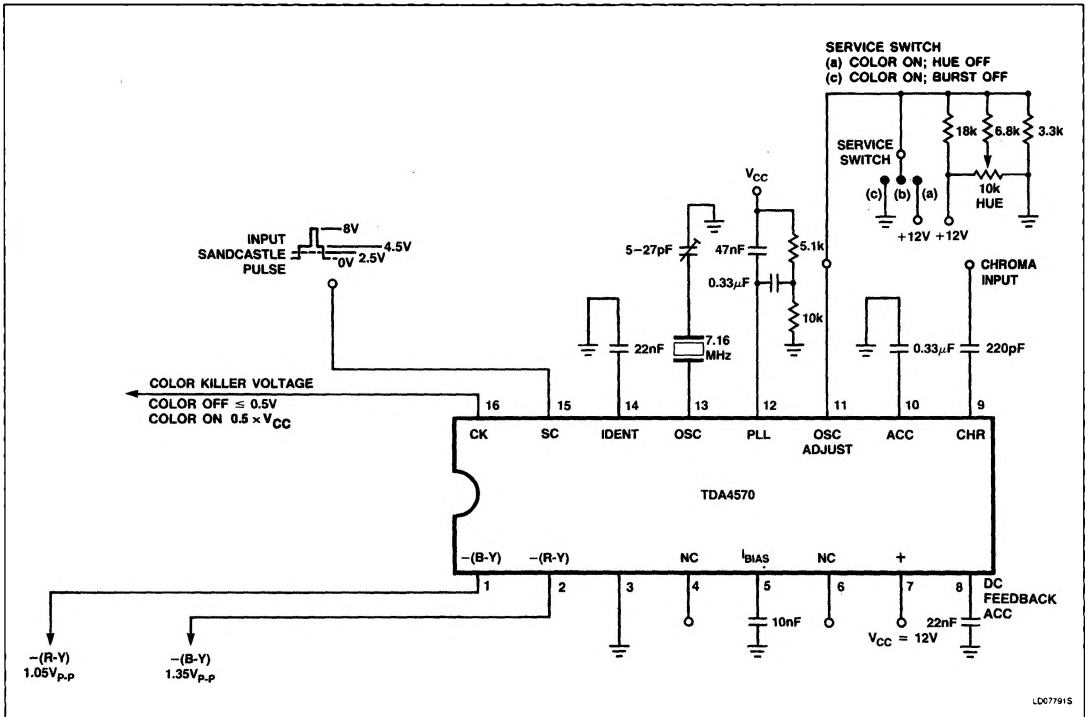

NOTE:
Crystal frequency = 7.16MHz; resonance resistance 60Ω; load capacitance 20pF, dynamic capacitance 22pF and static capacitance 5.5pF.

Figure 1