AN5313NK, AN5313NS

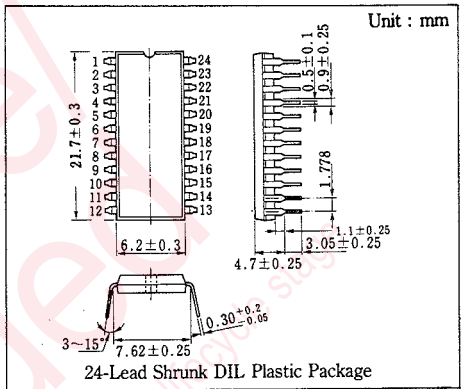
Color TV Video and Chrominance Signal Processing Circuits

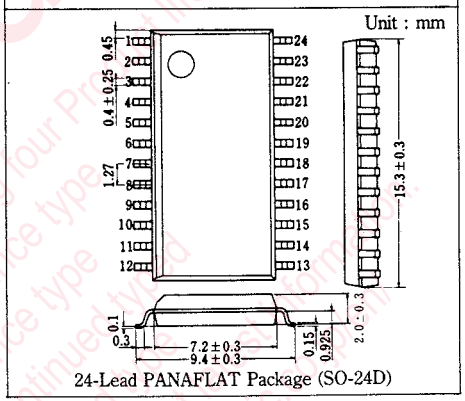
■ Outline

The AN5313NK and The AN5313NS are integrated circuits designed for all color TV video and chrominance signal processing circuits.

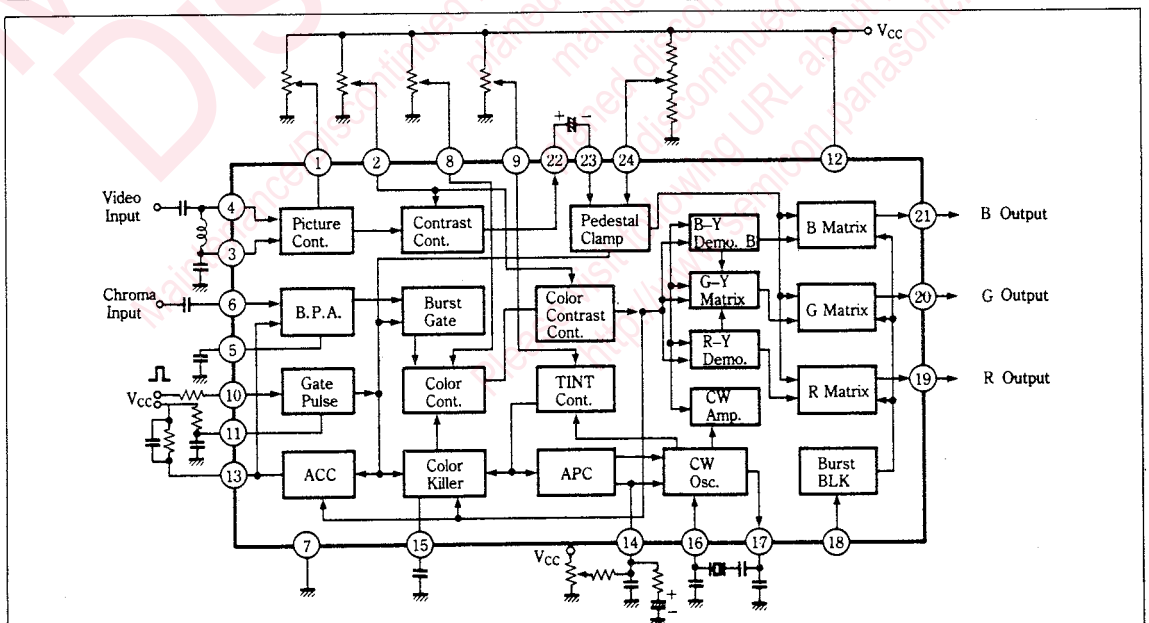
■ Features

- The AN5313NK and AN5313NS provide total video and chrominance signal processing circuit, allow compact set design
- Low voltage operation (4.0V～5.6V)
- Incorporates luminance signal mixing circuit and provides R. G. B. color output
- All DC control system for simplicity of wiring (color, tint, contrast picture, luminance)





■ Block Diagram



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■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	Picture Control	13	ACC Filter
2	Contrast Control	14	APC Filter
3	Video Input(1)	15	Color Killer Filter
4	Video Input(2)	16	3.58MHz Oscillator Input
5	Chrominance By-Pass	17	3.58MHz Oscillator Output
6	Chrominance Input	18	Blanking Pulse Input
7	GND	19	R Output
8	Color Control	20	G Output
9	Tint Control	21	B Output
10	Hor. Sync Input	22	Y Output
11	Burst Gate Pulse Width Adjustment	23	Y Input
12	V_{CC}	24	Brightness Control

■ Absolute Maximum Ratings (T_a=25℃)

Item		Symbol	Rating		Unit
Voltage	Supply Voltage	V_{CC}	6.0		V
	Circuit Voltage	V_{12-7}	0	6.0	V
		$V_{1,\ 2,\ 8,\ 9,\ 24-7}$	0	V_{12-7}	V
		V_{10-7}	−2	V_{12-7}	V
		V_{18-7}	−3	V_{12-7}	V
Current	Circuit Current	I	−30	+5	mA
Power Dissipation(Ta=70℃)		P_D	400		mW
Temperature	Operating Ambient Temperature	T_{opr}	−20~+70		℃
	Storage Temperature	T_{stg}	−55~+150		℃

■ Typical Operation Condition (T_a=25℃)

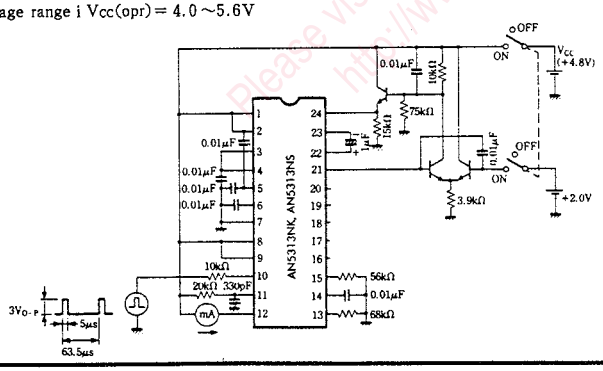
Item	Symbol	typ.		Unit
Supply Voltage	V_{CC}	4.8		V
Chroma Input Signal (Burst Signal)	v_6	typ. 75	max. 150	mV_{P-P}
Video Input Signal (Sync.~White Level)	v_3, v_4	typ. 0.2	max. 0.3	V_{P-P}
Horizontal Sync. Signal Input (Burst Gate Pulse)	V_{P10}	3.0/4.7μs		V_{O-P}
Blanking Pulse	V_{P18}	3.0/12μs		V_{O-P}
Color Control Voltage	V_8	0~4.8		V
Tint Control Voltage	V_9	0~4.8		V
Contrast Control Voltage	V_2	0~4.8		V
Picture Control Voltage	V_1	0~4.8		V
Brightness Control Voltage	V_{24}	1.4~2.6		V

■ Electrical Characteristics (V_{CC}=12V, T_a=25℃)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Total Circuit Current	I_{tot}	1	V_{CC}=4.8V	27	37	47	mA
Color Difference Output Voltage (1)	$e_{o(1)}$	2	Rainbow 75mVp-p, Color Center, Contrast max.	0.5	0.7	0.9	V_{P-P}
ACC Characteristics	ACC	2	Rainbow 75mVp-p, Color Center, Contrast max.	0.7	0.9	1.1	times
Color Difference Output Voltage (2)	$e_{o(2)}$	2	Rainbow 75mVp-p, Color max., Contrast max.	1.6	2.2	3.1	V_{P-P}
Color Leak	e_{LC}	2	Rainbow 75mVp-p, Color min., Contrast max.		10	40	mV_{P-P}
Oscillation Frequency	f_{osc}	3	Pin⑥input invalid signal, Trimmer to be set by standard samples			±170	Hz
Control Sensitivity(VCO)	β	3	Frequency change when V_1 (3.4V) and V_2 (3.6V) are applied to Pin⑭	2.7	3.0	3.3	Hz/mV
Phase Detector Sensitivity (APC)	μ	3	Apply $\Delta\theta$ changed frequency for burst phase to Pin⑮ of 10° Pin⑭voltage change	19	23	27	mV/deg.
APC Pull-in Range	f_{APC}	3	Raibow 75mVp-p, measured by changing burst frequency	±450	±550		Hz
Tint Variable Range	$\theta_{(Tint)}$	2	Rainbow 75mVp-p, Color center, Tint min.~max.	+17 −48	+27 −58	+37 −68	deg.
Demodulation Output Ratio(1)	R/B	4	Pin⑥3.58MHz, 75mV_{P-P} Pin⑯3.59MHz,500mV_{P-P} Measure beat frequency of Pins⑲, ⑳, and㉑. R Output/B Output	0.86	0.94	1.04	times
Demodulation Output Ratio(2)	G/B	4	Pin⑥3.58MHz, 75mV_{P-P} Pin⑯3.59MHz,500mV_{P-P} Measure beat frequency of Pins⑲, ⑳, and㉑. G Output/B Output	0.25	0.30	0.35	times
Demodulation Angle(1)	∠R	4	Pin⑥3.58MHz, 75mV_{P-P} Pin⑯3.59MHz,500mV_{P-P} P-P ∠B=0 degree R-B phase difference	94	97.5	103	deg.
Demodulation Angle(2)	∠G	4	Measure beat frequency of Pins⑲, ⑳, and㉑. G-B phase difference	228	235	242	deg.
Demodulation Output Residual Carrier	e_{car}	3	Input invalid signal, 3.58MHz of each output Carrier leak element		40	60	mV_{P-P}
Color Difference Output Contrast Ratio	Δe_{oc}	2	Rainbow 75mVp-p, Color center, Tint center, Contrast min.~max.	3.0	3.7	4.25	times
Color Killer Level	e_k	2	Rainbow 75mVp-p, Color center, Tint center, Contrast min.~max.	−39	−34	−28	dB
Voltage Amplification(Video)	A_V	5	f=20kHz Sine wave input 0.1 Vp-p Picture min. Contrast max.	6.1	6.9	7.7	times
Video Output Contrast Ratio	Δe_{vc}	5	Picture min. Contrast variable	3.5	4.3	5.0	times
Picture Variable Range	Δf_{vp}	5	f=2.5MHz, 0.2 Vp-p input, Picture max./min.	18	21	24	dB
DC Transfer Rate	T_{DC}	5	Video input 0.2 Vp-p, APL10~90%	92	97		%
Y Output DC Voltage	E_O	3	Video input invalid signal, Contrast max.	1.2	2.0	2.8	V
E_{C-Y} Change with Ambient Temperature	$\Delta E_{C-Y}/\Delta Ta$	3	Ta=−20~70℃		−3.6		mV/℃

Note: Operating supply voltage range i Vcc(opr)=4.0~5.6V

Test Circuit 1 (I_{tot})



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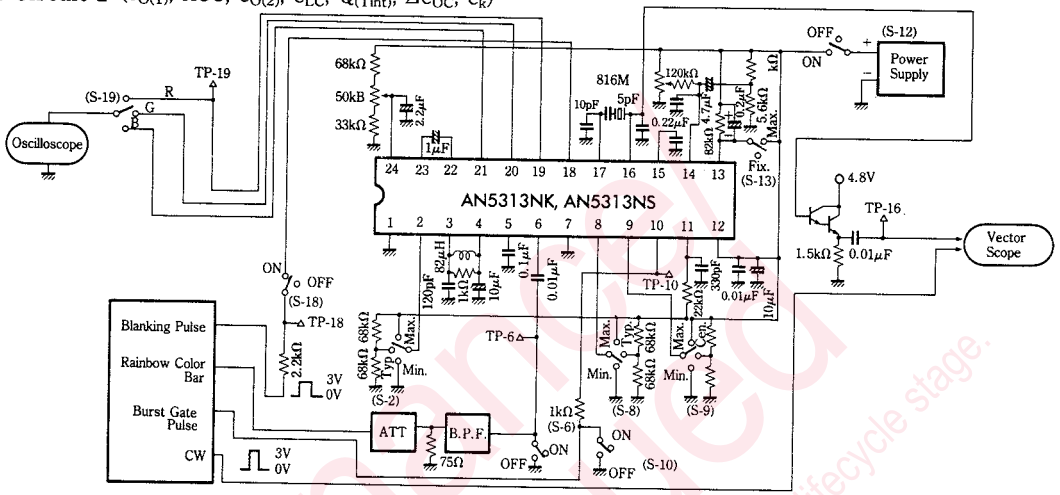
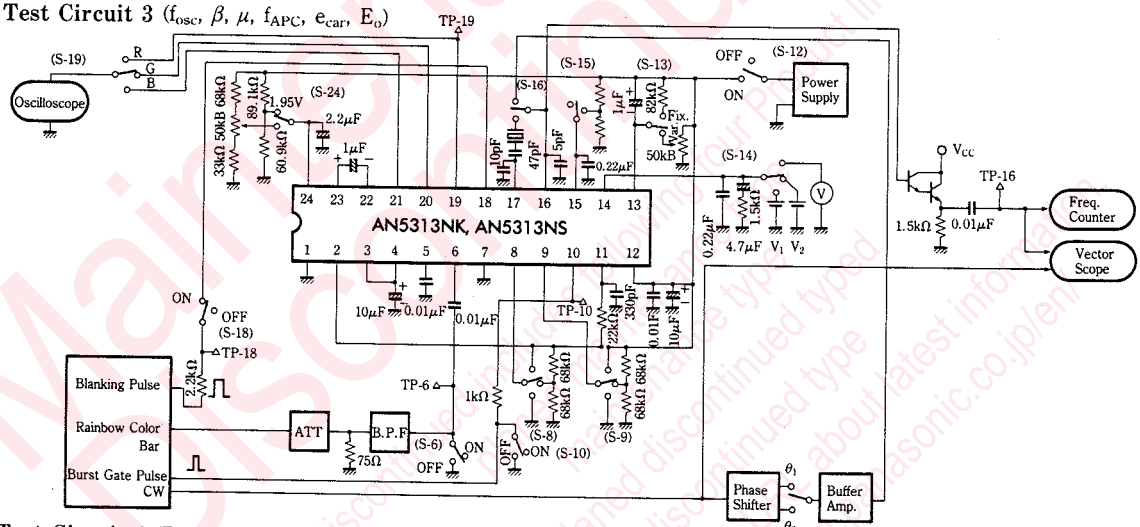
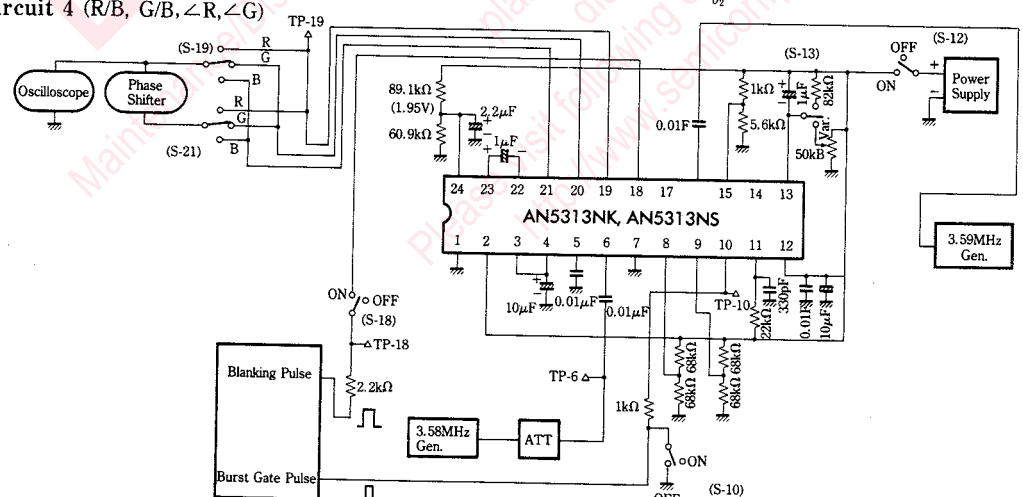
Test Circuit 2 ($e_{O(1)}$, ACC, $e_{O(2)}$, e_{LC}, $Q_{(Tint)}$, Δe_{OC}, e_k)



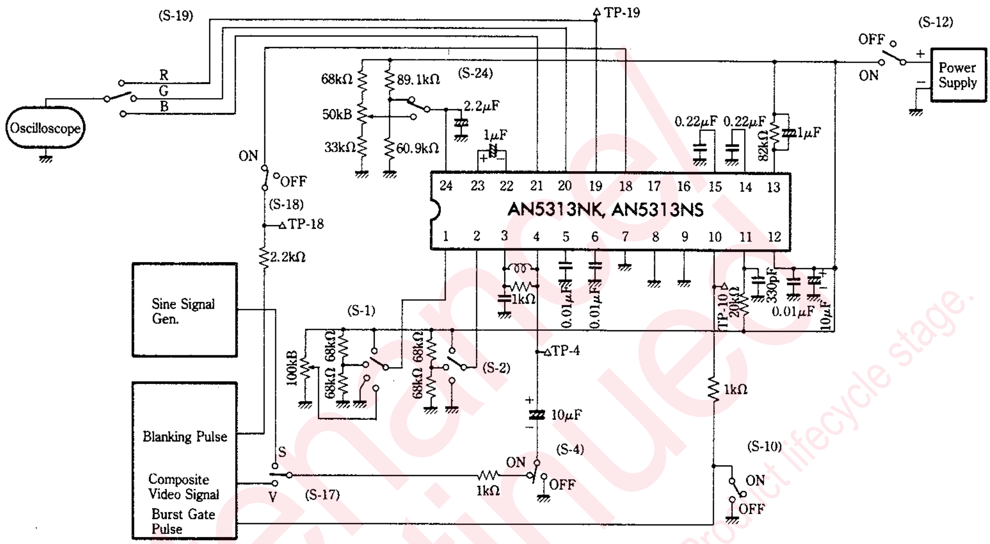
Test Circuit 3 (f_{osc}, β, μ, f_{APC}, e_{car}, E_o)



Test Circuit 4 (R/B, G/B, ∠R, ∠G)

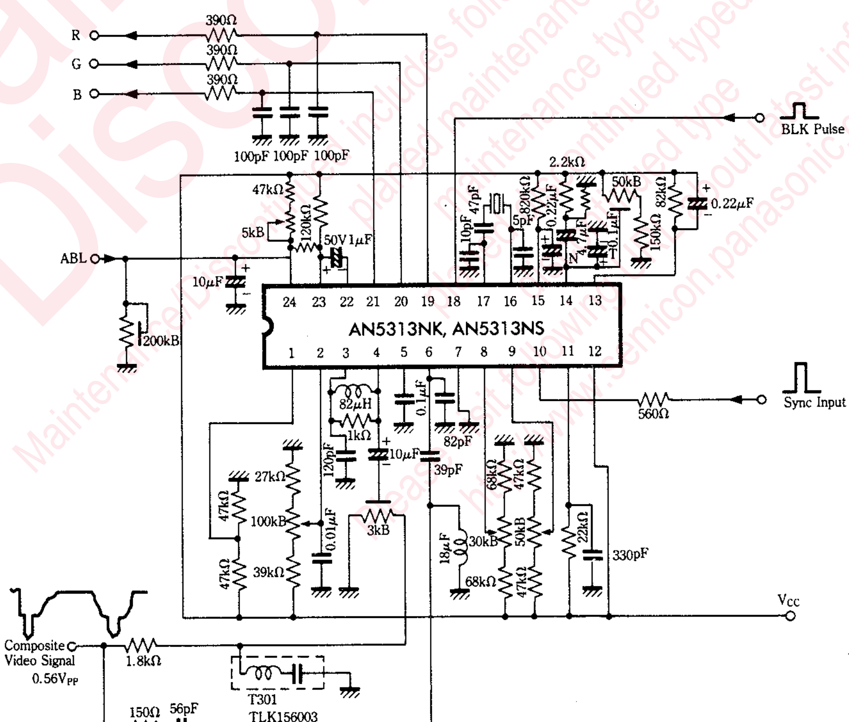


Test Circuit 5 (G_V, Δe_{VC}, Δf_{VP}, T_{DC})



(S-19)
TP-19
(S-12)
OFF
ON
Power Supply
R
G
B
Oscilloscope
68kΩ
89.1kΩ
(S-24)
50kB
2.2μF
33kΩ
60.9kΩ
1μF
0.22μF
0.22μF
82kΩ
1μF
ON
OFF
(S-18)
TP-18
2.2kΩ
AN5313NK, AN5313NS
Sine Signal Gen.
(S-1)
100kB
68kΩ
68kΩ
68kΩ
68kΩ
(S-2)
1kΩ
0.01μF
0.01μF
TP-4
TP-10
20kΩ
330pF
0.01μF
10μF
1kΩ
10μF
Blanking Pulse
Composite Video Signal
Burst Gate Pulse
S
V
(S-17)
1kΩ
ON
(S-4)
OFF
(S-10)
ON
OFF

Application Circuit



R
G
B
390Ω
390Ω
390Ω
100pF 100pF 100pF
BLK Pulse
2.2kΩ
47kΩ
50kB
82kΩ
0.22μF
5kB
120kΩ
50V 1μF
10pF
47pF
820kΩ
5pF
0.22μF
4.7μF
0.1μF
150kΩ
ABL
10μF
200kB
AN5313NK, AN5313NS
82μH
1kΩ
0.1μF
10μF
82pF
39pF
120pF
560Ω
Sync Input
27kΩ
47kΩ
100kB
0.01μF
3kB
68kΩ
47kΩ
30kB
50kB
18μF
22kΩ
330pF
47kΩ
39kΩ
68kΩ
47kΩ
Vcc
Composite Video Signal 0.56V$_{PP}$
1.8kΩ
150Ω
56pF
T301
TLK156003

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