

Monolithic linear IC



Overview

The LA7698 performs flesh-tone correction and green enhancement for color TV color-difference signals, and includes a color limiter function that prevents color saturation on the screen and color noise reduction (CNR) circuitry that eliminates color-difference output noise.

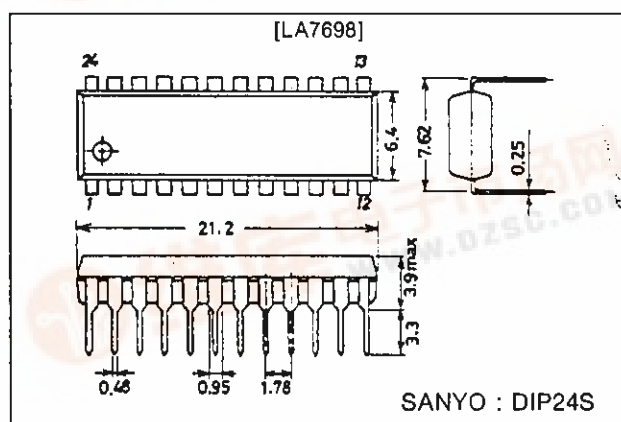
Functions and Features

- Flesh-tone correction, green enhancement, color limiter and CNR.
- The center axis of flesh-tone correction can be adjusted.
- Because green detection is performed through R-Y and B-Y detection, OSD green is not enhanced.
- The demo mode switch makes it possible to turn flesh-tone correction and green enhancement on and off for the left and right sides of the screen independently.
- The effectiveness of CNR can be adjusted through an external capacitor.

Package Dimensions

unit: mm

3067-DIP24S



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CCmax}		13	V
Allowable power dissipation	P _{d max}	T _a ≤ 65°C	700	mW
Operating temperature	T _{opr}		-15 to +65	°C
Storage temperature	T _{stg}		-55 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V _{CC}		9	V
Operating supply voltage range	V _{CCOP}		8 to 10	V

LA7698

Operating Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 9\text{ V}$

Parameter	Symbol	Conditions	min	typ	max	Unit	Note
Current consumption	I_{CC}		19	27	41	mA	*1,2
Output voltage	V_O	Pin 9 (H-BLK IN) = 2 V	5	5.25	5.5	V	*1,2
Output voltage difference	ΔV_O	Pin 9 (H-BLK IN) = 2 V		0	50	mV	*1,2
Output voltage variation	ΔV_{O-H}	INPUT C = 1 μF	-1	-0.1	0	mV	*1,2
Input/output gain	G_O	INPUT = Sin : 100 kHz	-0.70	-0.35	-0.05	dB	*1,2
Input/output gain difference	ΔG_O	INPUT = Sin : 100 kHz		0	0.15	dB	*1,2
Frequency characteristics	F_O	Assuming 100 kHz as 0 dB, the frequency where a 3 dB decrease results	5			MHz	*1,2
Maximum output amplitude	E_{max}		4.1	4.7		Vp-p	*1,2
BLK threshold voltage	TH_{BLK}		1.0	1.4	1.8	V	*1,2
BLK minus allowable voltage	$-V_{BL}$		-0.7			V	*1,2
DEMO threshold voltage	TH_{DEMO}		3.5	3.7	3.9	V	*1,2
Color difference input voltage	$V_{IN, C-Y}$	Pin 9 (H-BLK IN) = 2 V	6.15	6.40	6.65	V	*1,2
Output voltage temperature characteristic	$\alpha V_O / \alpha T$	Pin 9 (H-BLK IN) = 2 V		0		mV/°C	*1,2
Variation for no green enhancement input	ΔV_{C-YG}	No input pin 11 0 V/9 V	-10	0	+10	mV	*1
Maximum green enhancement level	ΔV_{G-YGM}	$P_{IN} = 227^\circ$, $E_{B-Y} = 2\text{ Vp-p}$, pin 11 = 9 V	200	225	245	mV	*1
	ΔV_{R-YGM}	$P_{IN} = 227^\circ$, $E_{B-Y} = 2\text{ Vp-p}$, pin 11 = 9 V	-245	-225	-200	mV	*1
Green enhancement range + 1	ΔV_{G-YG+}	$P_{IN} = 180^\circ$, $E_{B-Y} = 2\text{ Vp-p}$, pin 11 = 9 V	9	16	26	mV	*1
Green enhancement range + 2	ΔV_{R-YG+}	$P_{IN} = 180^\circ$, $E_{B-Y} = 2\text{ Vp-p}$, pin 11 = 9 V	-26	-16	-9	mV	*1
Green enhancement range - 1	ΔV_{C-YG-}	$P_{IN} = 270^\circ$, $E_{B-Y} = 2\text{ Vp-p}$, pin 11 = 9 V	5	10	18	mV	*1
Green enhancement range - 2	ΔV_{R-YG-}	$P_{IN} = 270^\circ$, $E_{B-Y} = 2\text{ Vp-p}$, pin 11 = 9 V	-18	-10	-5	mV	*1
Green enhancement starting amplitude	E_{B-YGS}	$P_{IN} = 227^\circ$, pin 11 = 9 V ΔV_{G-Y} , G = 5 mV	0.36	0.45	0.75	Vp-p	*1
G OSD variation during green enhancement	ΔV_{GOSD}	Only G-Y $\pm 2\text{ V}$, pin 7 = 9 V		0	50	mV	*1
Flesh-tone correction voltage variation	ΔV_{C-YF}	No input pin 12 0 V/9 V	-10	0	+10	mV	*1
Flesh-tone correction phase	P_{AF-1}	$P_{IN} = 120^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = open, pin 12 = 9 V	117	120	123	deg	*1
	P_{AF-2}	$P_{IN} = 105^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = 1 V, pin 12 = 9 V	102	105	108	deg	*1
	P_{AF-3}	$P_{IN} = 138^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = 6 V, pin 12 = 9 V	135	138	141	deg	*1
Maximum correction level + 1	$\Delta V_{B-Y FM+}$	$P_{IN} = 135^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = open, pin 12 = 9 V	68	85	103	mV	*1
Maximum correction level + 2	$\Delta V_{R-Y FM+}$	$P_{IN} = 135^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = open, pin 12 = 9 V	21	26	31	mV	*1
Maximum correction level - 1	$\Delta V_{B-Y FM-}$	$P_{IN} = 105^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = open, pin 12 = 9 V	-120	-100	-80	mV	*1
Maximum correction level - 2	$\Delta V_{R-Y FM-}$	$P_{IN} = 105^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = open, pin 12 = 9 V	-10	0	+10	mV	*1
Flesh-tone correction range + 1	$\Delta V_{B-Y F+}$	$P_{IN} = 50^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = open, pin 12 = 9 V	-10	0	+10	mV	*1
Flesh-tone correction range - 1	$\Delta V_{B-Y F-}$	$P_{IN} = 200^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = open, pin 12 = 9 V	-10	0	+10	mV	*1
Flesh-tone correction range - 2	$\Delta V_{R-Y F-}$	$P_{IN} = 200^\circ$, $E_{B-Y} = 1\text{ Vp-p}$, pin 14 = open, pin 12 = 9 V	-10	0	+10	mV	*1
Flesh-tone correction starting amplitude	$E_{B-Y FS}$	$P_{IN} = 105^\circ$, pin 14 = open ΔV_{B-Y} , F = 5 mV	0.1	0.2	0.35	Vp-p	*1
Limiter red detection level	$E_{B-Y RD}$	$P_{IN} = 104^\circ$, pin 13 = 9 V, pin 15 = open	2.6	3.0	3.4	Vp-p	*1
Limiter magenta detection level	$E_{B-Y MD}$	$P_{IN} = 61^\circ$, pin 13 = 9 V, pin 15 = open	1.7	2.0	2.3	Vp-p	*1

Continued on next page.

LA7698

Continued from preceding page.

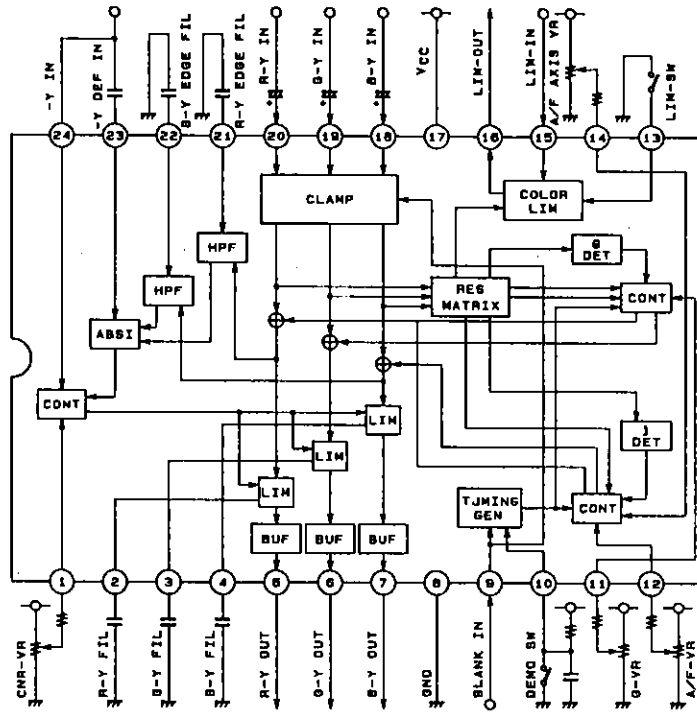
Parameter	Symbol	Conditions	Min	Typ	Max	Unit	Note
Tracking magenta detection	$E_{B-Y} \text{ MDT}$	$P_{IN} = 61^\circ$, pin 13 = 9 V, pin 15 = 3.4 V	2.9	3.3	3.7	Vp-p	*1
Limiter switch off voltage	$V_{CL \text{ OFF}}$	$P_{IN} = 61^\circ$, $E_{B-Y} = 3 \text{ Vp-p}$, pin 15 = open	0.4	0.6	0.8	V	*1
Green enhancement release voltage	$V_{GL \text{ OPEN}}$	pin 11 open level	6.8	7.0	7.2	V	*1
Flesh-tone correction release voltage	$V_{FL \text{ OPEN}}$	pin 12 open level	6.8	7.0	7.2	V	*1
Flesh-tone phase release voltage	$V_{FP \text{ OPEN}}$	pin 14 open level	3.3	3.5	3.7	V	*1
CNR-ON voltage variation	$\Delta V_{C-Y \text{ CNR}}$	No input pin 1 0 V/9 V	-10	0	+10	mV	
Maximum limiter amount	R-Y	$V_{CNR} = 9 \text{ V}$, pin 23 = GND, pin 24 = 7 V $V_2 (+100 \mu\text{A}) - V_2 (-100 \mu\text{A})$	600	715	785	mV	
	G-Y	$V_{CNR} = 9 \text{ V}$, pin 23 = GND, pin 24 = 7 V $V_3 (+100 \mu\text{A}) - V_3 (-100 \mu\text{A})$	285	340	370	mV	
	B-Y	$V_{CNR} = 9 \text{ V}$, pin 23 = GND, pin 24 = 7 V $V_4 (+100 \mu\text{A}) - V_4 (-100 \mu\text{A})$	600	715	785	mV	
Minimum limiter amount	R-Y	$V_{CNR} = 0 \text{ V}$, pin 23 = GND, pin 24 = 7 V $V_2 (+100 \mu\text{A}) - V_2 (-100 \mu\text{A})$		0		mV	
	G-Y	$V_{CNR} = 0 \text{ V}$, pin 23 = GND, pin 24 = 7 V $V_3 (+100 \mu\text{A}) - V_3 (-100 \mu\text{A})$		0		mV	
	B-Y	$V_{CNR} = 9 \text{ V}$, pin 23 = GND, pin 24 = 7 V $V_4 (+100 \mu\text{A}) - V_4 (-100 \mu\text{A})$		0		mV	
Maximum limiter level	$G_{R-Y \text{ max}}$	INPUT = 500 kHz, 2 Vp-p, $V_{CNR} = 9 \text{ V}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-4.2		dB	
	$G_{G-Y \text{ max}}$	INPUT = 500 kHz, 1 Vp-p, $V_{CNR} = 9 \text{ V}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-3.5		dB	
	$G_{B-Y \text{ max}}$	INPUT = 500 kHz, 2 Vp-p, $V_{CNR} = 9 \text{ V}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-4.2		dB	
Minimum limiter level	$G_{R-Y \text{ min}}$	INPUT = 500 kHz, 0.2 Vp-p, $V_{CNR} = 0 \text{ V}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-0.5		dB	
	$G_{G-Y \text{ min}}$	INPUT = 500 kHz, 0.1 Vp-p, $V_{CNR} = 0 \text{ V}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-0.5		dB	
	$G_{B-Y \text{ min}}$	INPUT = 500 kHz, 0.2 Vp-p, $V_{CNR} = 0 \text{ V}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-0.5		dB	
Normal limiter level	$G_{R-Y \text{ typ}}$	INPUT = 50 kHz, 2 Vp-p, $V_{CNR} = \text{open}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-1.2		dB	
	$G_{G-Y \text{ typ}}$	INPUT = 50 kHz, 1 Vp-p, $V_{CNR} = \text{open}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-0.6		dB	
	$G_{B-Y \text{ typ}}$	INPUT = 50 kHz, 2 Vp-p, $V_{CNR} = \text{open}$, pin 23 = GND, pin 24 = 7 V, pin 1 = 9 V		-1.2		dB	
Color edge detection sensitivity	ΔV_{SCE}	Voltage difference between open voltage of pins 21 and 22 and edge detection	± 60	± 85	± 110	mV	
Y edge detection sensitivity	ΔV_{SYE}	Voltage difference between open voltage of pin 23 and edge detection	± 130	± 160	± 190	mV	
Y level detection voltage	$V_{Y \text{ min}}$	No edge detection $V_{CNT} = 9 \text{ V}$	0.9	1.2	1.5	V	
Y level detection voltage	$V_{Y \text{ max}}$	No edge detection $V_{CNT} = 9 \text{ V}$	3.6	3.9	4.2	V	
Limiter level control	V_{LCNT1}	Control voltage at which limiter amount is 50 mV	4.5	4.75	5.0	V	
Limiter level control	V_{LCNT2}	Control voltage which is -50 mV from maximum limiter amount	7.0	7.25	7.5	V	
Color edge filter voltage	$V_{EF \text{ OPEN}}$	Open DC voltage of pins 21 and 22	4.65	4.9	5.15	V	
-Y differential input voltage	$V_{dY \text{ OPEN}}$	Open DC voltage of pin 23	3.7	3.9	4.1	V	
Limiter control voltage	$V_{CNT \text{ OPEN}}$	Open DC voltage of pin 1	5.8	6.0	6.2	V	
Limiter filter voltage	$V_{LF \text{ OPEN}}$	Open DC voltage of pins 2, 3 and 4	3.95	4.2	4.45	V	

Notes: *1) When the CNR limiter level is at a minimum (pin 1 = 0 V)

*2) When both the green enhancement level and flesh-tone correction level are both at a minimum
(pin 11 = 0 V; pin 12 = 0 V)

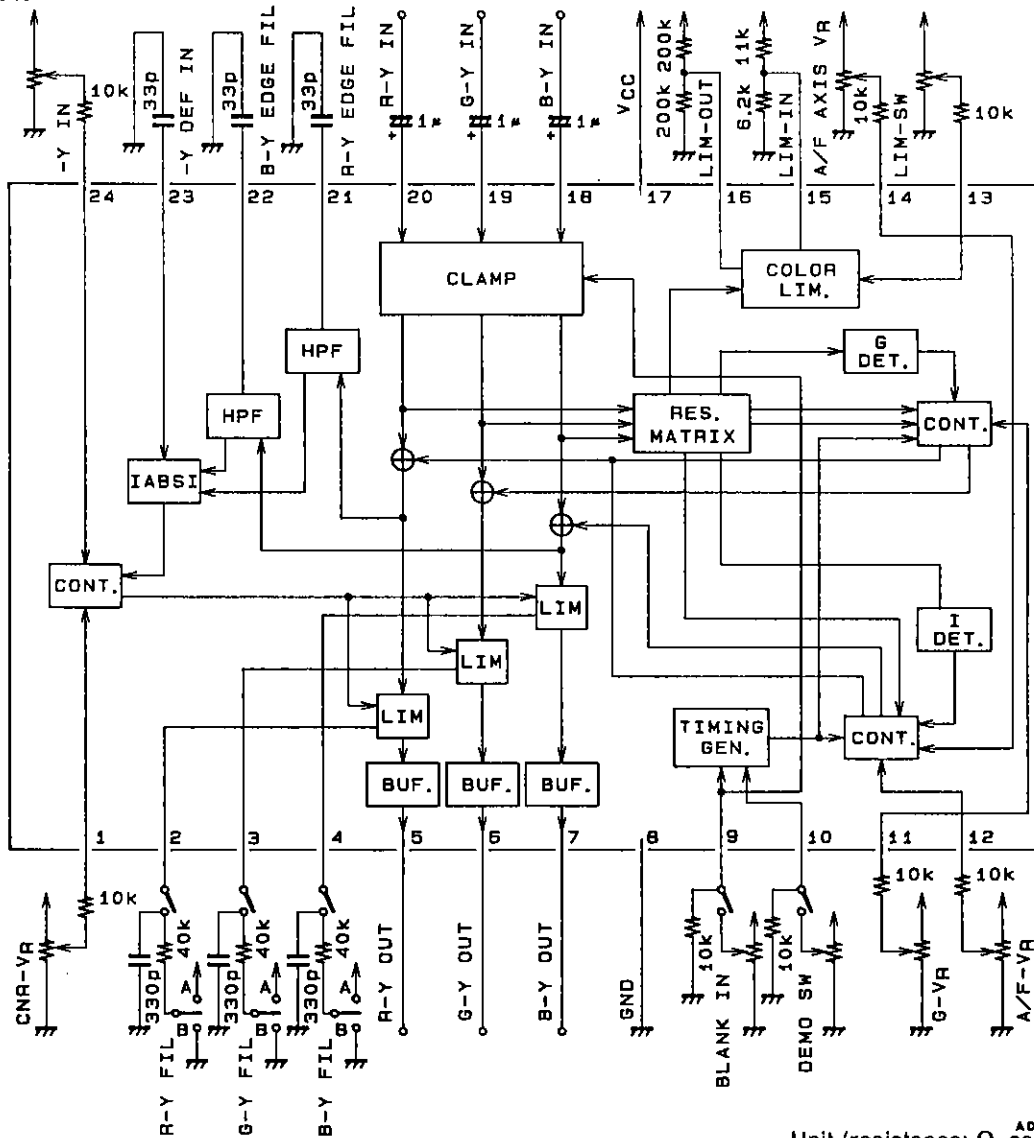
LA7698

Block Diagram



A00081

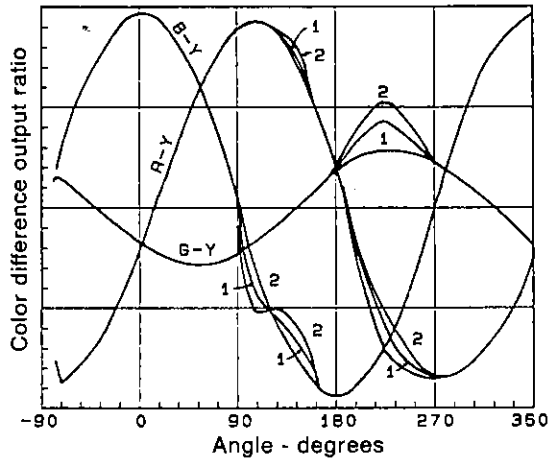
Test Circuit



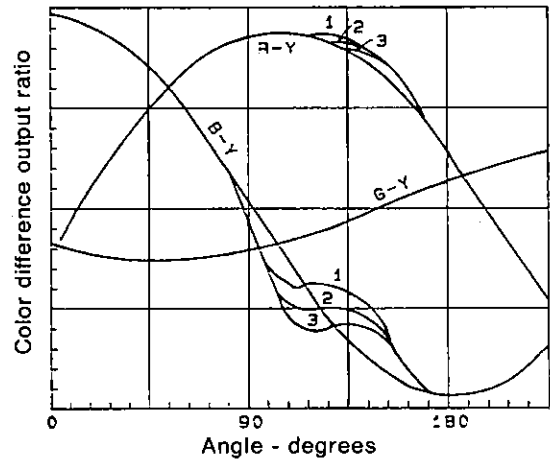
Unit (resistance: Ω , capacitance: F) A00084

Note: All V_R s are 10 k Ω variable resistors

Flesh-tone correction and green enhancement characteristics



Flesh-tone center adjustment



- No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.
- Anyone purchasing any products described or contained herein for an above-mentioned use shall:
 - ① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use;
 - ② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.