

**SANYO**

No. 4361

**LA7674****Color TV Single-Chip Signal Processor for NTSC  
Systems (PLL Detection)**

## Overview

The LA7674 improves upon the black-level, horizontal-jitter, switch-on drift performance of the single-chip LA7672 used to date. Also a single-chip IC, the LA7674 is for color TVs based on the NTSC (National Television System Committee) system with an on-chip circuit for all VIF, SIF, video, chroma and deflection signal processing.

## Functions and Features

### [VIF]

- PLL detection (high video and audio quality)
- High-gain VIF amplifier
- High speed AGC
- On-chip APC time constant switch

### [SIF]

- Simultaneous sound IN/OUT
- Video/audio simultaneous muting, or audio-only muting possible

### [Audio-visual switch]

- Internal/external audio-visual switch ( $V_{CC} = 9V$ )

Delay line	Video external, audio external	Switch rating
OFF	IN	6.9 to 9.0V
OFF	EXT	4.7 to 6.6V
ON	EXT	2.4 to 4.3V
ON	IN	0 to 2.1V

### [OSD]

- RGB 3 input
- RGB linear amplifier (– 6dB input: 2V to 5V)
- Fast blanking (B input combined use)

### [Chroma]

- On-chip ACC filter, On-chip killer filter, Killer-circuit hysteresis operation
- On-chip carrier filter

### [Video]

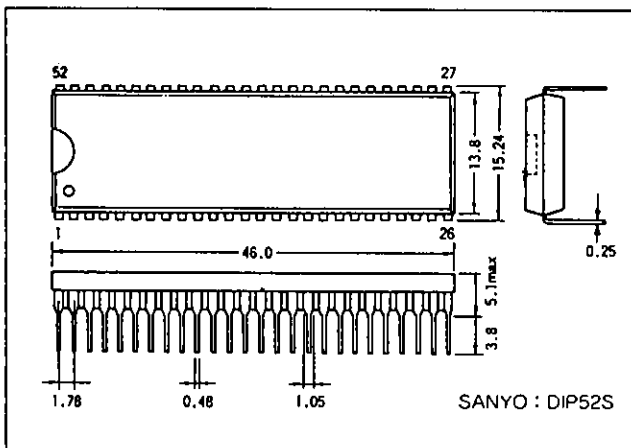
- Black enhancement
- DC playback
- On-chip delay line
- Wide band width (9MHz): delay line short
- Dual rank on-chip differentiation circuit also available for soft also
- S input supported (VCR application)
- Variable DC transmission volume available (externally attached circuit adjustment)

### [Deflection]

- Adjustment-free horizontal, vertical synchronization
- Dual AFC system with excellent anti-noise characteristics
- External adjustment of vertical synchronization sensitivity
- Vertical size is constant with no-signal
- Highly stable image during playback of copy protected tapes (macro-vision tape etc.)
- High stability against VCR skew distortion

## Package Dimensions

unit : mm

**3128-DIP52S****SANYO Electric Co., Ltd. Semiconductor Business Headquarters**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

41893TS A8-9533 No.4361-1/6

## Specifications

### Absolute Maximum Ratings at Ta = 25° C

			unit
Maximum supply voltage	V11 max	11	V
	V14 max	11	V
Maximum supply current	I30max	16	mA
Allowable power dissipation	Pd max	Ta ≤ 60°C	1.35 W
Operating temperature range	Topr	-10 to +65	°C
Storage temperature range	Tstg	-55 to +150	°C
Circuit current	I44	-6	mA
	I6	-3	mA
FBP input current	I22 max	Peak current	5 mA
	I21 max	Peak current	10 mA

### Operating Conditions at Ta = 25° C

			unit
Recommended supply voltage	V11	9	V
	V14	9	V
Recommended supply current	I30	13	mA
Operating voltage range	V11op	8 to 9.5	V
	V14op	8 to 9.5	V
Operating current range	I30op	10 to 16	mA

### Operating Characteristics at Ta = 25°C, VCC = V11 = V14 = 9 V, ICC = I30 = 13 mA

#### [Circuit Voltage and Current]

			min	typ	max	unit
Horizontal supply voltage	V30	VCC = 9V, ICC = 13mA	7.3	7.8	8.3	V
Supply current	I11 + 14	VCC = 9V, ICC = 13mA, IF AGC 4V	102	120	138	mA

#### [VIF]

Quiescent video output voltage	V44	Quiescent	4.3	4.7	5.1	V
Quiescent AFT output voltage	V47	Quiescent	3.1	4.7	6.1	V
Maximum RFAGC voltage	V49H	CW = 85dBμ, RFAGCVR = min	7.6	8.0	8.3	V
Minimum RFAGC voltage	V49L	CW = 85dBμ, RFAGCVR = max	0	0.01	0.3	V
Input sensitivity	Vi	VIF input level for video output at 0.8Vp-p (40% mod).	33	39	45	dBμ
AGC range	GR	Maximum input (V0 = 0.8Vp-p) - input sensitivity	54	62	70	dB
Maximum permissible input	Vi max	VIF input level for video output at +1dB	97	104	111	dBμ
Video output detection	V044	Vi = 80dBμ, AM = 78% mod	1.7	2.0	2.3	Vp-p
Differential gain	DG	Vi = 80dBμ, AM = 87.5%, video mod		3.0	10	%
Differential phase	DP	Vi = 80dBμ, AM = 87.5%, video mod		1.0	10	DEG
Video S/N	S/N	Vi = 80dBμ, 20 log $\frac{1.46 (Vp-p)}{\text{noise (Vrms)}}$	47	54	61	dB
Synchronization signal tip level	V44 TIP	CW = 80dBμ	2.1	2.4	2.7	V
Frequency characteristic	fC	Frequency at video output of -3dB	6.0	9.0	12.0	MHz
920 kHz VIF intermodulation	I920	V3.58MHz/V920kHz, Vi = 80dBμ	35	42	49	dB
Maximum AFT output voltage	V47H	CW = 80dBμ, frequency change	8.3	8.7	9.0	V
Minimum AFT output voltage	V47L	CW = 80dBμ, frequency change	0.1	0.3	0.8	V
AFT detection sensitivity	Sf	CW = 80dBμ, frequency change	45	70	100	mV/kHz
AFT switch operation start voltage	VAFTSW	Measuring with sweep signal	0.5	1.0	1.5	V
Black noise threshold level	VBTH	Measuring with sweep signal	1.1	1.4	1.7	V
APC pull-in range (U)2	fPU-2	CW = 80dBμ, fp = 53MHz to 64MHz	0.8	1.7	4.0	MHz
APC pull-in range (L)2	fPL-2	CW = 80dBμ, fp = 53MHz to 64MHz		-2	-1	MHz
VCO maximum variable range	ΔfU	Quiescent	0.9	1.7	4.0	MHz
	ΔfL	Quiescent	-4	-2	-1	MHz
VCO control sensitivity	β	Quiescent	1.5	3.0	5.5	kHz/mV

#### [Audio-visual Switches]

Video output DC voltage	V38	Quiescent	3.0	3.4	3.8	V
Internal video input voltage	V42	Quiescent	4.4	4.8	5.2	V
External video input voltage	V40	Quiescent	4.4	4.8	5.2	V
External audio input voltage	V3	Quiescent	5.2	5.6	6.0	V

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**[SIF AF]**

			min	typ	max	unit
SIF limiting voltage	$V_{i\text{ lim}}$	SIF output level for detection output at -3dB	33	40	47	dB $\mu$
FM detection output voltage	$V_{O1}$	$V_i = 100\text{dB}\mu$ , $\Delta f = \pm 25\text{kHz}$	440	550	670	mVrms
FM detection output distortion ratio	THD	$V_i = 100\text{dB}\mu$ , $\Delta f = \pm 25\text{kHz}$	0	0.4	1.0	%
AM rejection	AMR	$V_i = 100\text{dB}\mu$ , $\frac{\text{FM} : \Delta f = \pm 25\text{kHz}}{\text{AM} : 30\%}$	40	60	80	dB
AF amplifier voltage gain	$G_{AF}$	$V_i = 100\text{mVrms}$ , $f = 400\text{Hz}$	18	20	22	dB
AF maximum output voltage	$V_{O6\text{ max}}$	Output level for AF amplifier output distortion at 10%	2.0	2.8	3.6	Vrms
AF electronic attenuator range	ATT	$V_i = 200\text{mVrms}$ , $f = 400\text{Hz}$	70	80	100	dB

**[Video]**

Black enhancement threshold	$B_{STH}$	APL variable	40	50	60	IRE
Maximum black enhancement gain	$BS_{\text{max}}$	APL variable	-35	-27	-20	IRE
Soft video tone variable range	$\Delta\text{Soft}$	$f = 2\text{MHz}$ , 100mVp-p video tone VR: 4V $\rightarrow$ 0V	-6	-4	-2	dB
Sharp video tone variable range	$\Delta\text{Sharp}$	$f = 2\text{MHz}$ , 100mVp-p video tone VR: 4V $\rightarrow$ 9V, contrast VR: 6V	7	10	13	dB
Video voltage gain audio-visual Switch 9V	$GV9V$	$f = 100\text{kHz}$ , 100mVp-p, contrast VR: 9V, video tone VR: 4V	15	18	21	dB
Video voltage gain audio-visual Switch 0V	$GV0V$	$f = 100\text{kHz}$ , 100mVp-p, contrast VR: 0V, video tone VR: 4V	15	18	21	dB
Contrast control center	$C_{CEN}$	$f = 100\text{kHz}$ , 100mVp-p, contrast VR: 6V	0.4	0.48	0.57	Vp-p
Contrast variable control range	$\Delta C_V$	Contrast VR: 3V $\rightarrow$ 9V	18	20	22	dB
Bright control	$B R_H$	Bright VR: 2V	5.5	6.5	7.5	V
	$B R_{CEN}$	Bright VR: 4.5V	3.1	3.6	4.1	V
	$B R_L$	Bright VR: 7.5V		0.3	1.2	V
D.L. off frequency characteristics	$f_V 9V$	Contrast VR: 6V, video tone VR: 4V, 3dB down	7	9		MHz
D.L. on frequency characteristics	$f_V 0V$	Contrast VR: 6V, video tone VR: 4V, 3dB down	2.5	3	4	MHz
DC transmission	$R_{DC}$	Input: stair step signal, 500mVp-p	100	103	106	%
Delay line delay	$T_{DL}$	Input: white 100%	290	340	390	ns

**[Chroma]**

ACC amplitude characteristics	$A_{CC1}$	+6dB	-3	0	+3	dB
	$A_{CC2}$	-20dB	-7	0	+2	dB
ACC phase characteristics	$A_{CCP1}$	+6dB	-3	0	+3	°C
	$A_{CCP2}$	-20dB	-7	0	+7	°C
Killer operation point	$E_K$		-35	-28	-21	dB
Color control color residual	$E_C \text{ min}$	Color VR: 0V, contrast VR: 9V			50	mVp-p
Color control center	$E_{C\text{CEN}}$	Color VR: 4.5V, contrast VR: 6V	1.2	1.8	2.4	Vp-p
Maximum demodulation output	$E_C \text{ max}$	Color VR: 9V, contrast VR: 9V	3.2	4.0	4.8	Vp-p
Color contrast variable range	$\Delta C_C$	Color VR: B - Y = 2.5Vp-p, contrast VR: 3V $\rightarrow$ 9V	17.5	19.5	21.5	dB
Tint control center	$T_{CEN}$	Tint VR: 4.5V, color VR: 4.5V, contrast VR: 6V	0	12	24	°C
Tint variable range	$\Delta T$	Tint VR: 0V $\leftarrow$ 4.5V $\rightarrow$ 8V, color VR: 4.5V, contrast VR: 6V	$\pm 40$	$\pm 55$	$\pm 70$	°C
APC pull-in range	$\Delta f_{APC}$		$\pm 300$	$\pm 500$		Hz
Demodulator output ratio	R/B	Monochrome signal, contrast VR: 6V, color VR: B - Y = 1Vp-p	0.81	0.90	0.98	
	G/B	Monochrome signal, contrast VR: 6V, color VR: B - Y = 1Vp-p	0.24	0.30	0.38	
Demodulator phase angle	RB	Monochrome signal, contrast VR: 6V, color VR: B - Y = 1Vp-p	97	105	113	DEG
	GB	Monochrome signal, contrast VR: 6V, color VR: B - Y = 1Vp-p	-130	-120	-110	DEG
Demodulator output DC voltage	$V_{C-Y}$	Burst signal only, color VR: 0V	4.7	5.2	5.7	V
Demodulator output DC offset voltage	$\Delta V_{C-Y}$	Burst signal only, color VR: 0V	-200	0	+200	mV
Demodulator output residual carrier	$E_{\text{car}}$	Quiescent, killer off, color VR: 0V			0.05	Vp-p

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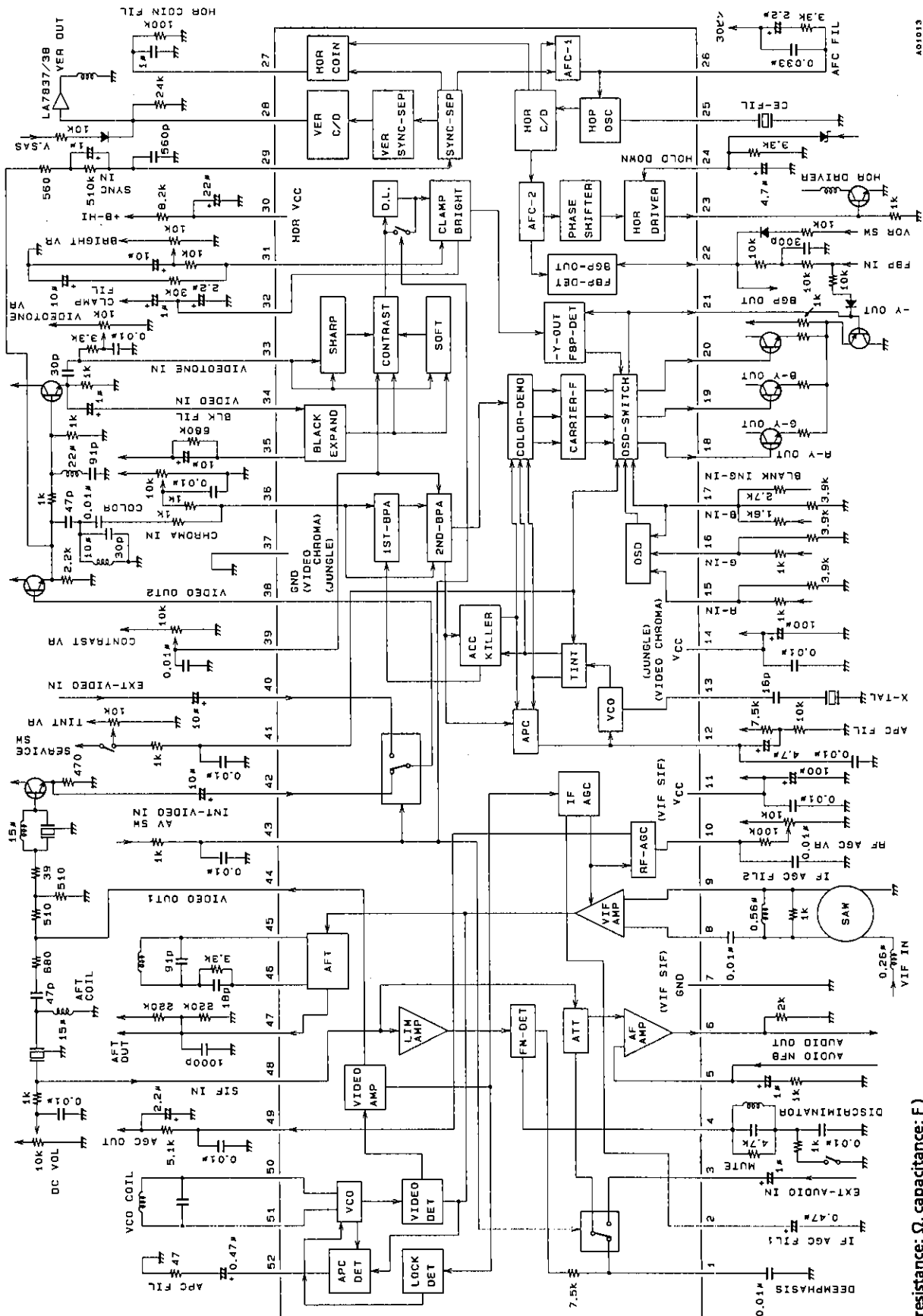
**[OSD]**

			min	typ	max	unit
Blanking pulse threshold level	TH <sub>BL</sub>	C – IN: color bar, B – IN: variable	0.5	0.8	1.1	V
– Y out DC voltage (OSD mode)	V <sub>Y</sub>	B – IN : 1.5V	2.5	2.8	3.1	V
RGB – in threshold level	TH <sub>R</sub>	R – IN: variable, B – IN: 1.5V	1.9	2.2	2.5	V
	TH <sub>G</sub>	G – IN: variable, B – IN: 1.5V				
	TH <sub>B</sub>	B – IN, variable				
RGB – Y out DC voltage (3 V)	V <sub>R3V</sub>	R, G, B – IN : 3V	5.2	5.5	5.8	V
	V <sub>G3V</sub>					
	V <sub>B3V</sub>					
RGB – Y out DC voltage (4 V)	V <sub>R4V</sub>	R, G, B – IN : 4V	5.7	6.0	6.3	V
	V <sub>G4V</sub>					
	V <sub>B4V</sub>					
RGB – Y out DC voltage (5 V)	V <sub>R5V</sub>	R, G, B – IN : 5V	6.2	6.5	6.8	V
	V <sub>G5V</sub>					
	V <sub>B5V</sub>					

**[Deflection]**

Synchronization separator input DC level	V <sub>SDC</sub>		6.0	6.3	6.6	V
Vertical free-running period	T <sub>V free</sub>		262	262.5	263	H
Maximum vertical synchronization period	T <sub>V max</sub>	Input: horizontal synchronization signal only	296.5	297	297.5	H
Minimum vertical synchronization period	T <sub>V min</sub>		224.5	225	225.5	H
Vertical blanking pulse width	P <sub>W VBL</sub>		20.25	20.5	20.75	H
Vertical blanking pulse wave	P <sub>H VBL</sub>		7.0	7.5		V
Height value						
Vertical output pulse width	P <sub>W VOUT</sub>		8.25	8.5	8.75	H
Vertical output voltage	V <sub>OUT H</sub>		5.7	6	6.3	V
	V <sub>OUT M</sub>		4.2	4.5	4.8	V
	V <sub>OUT L</sub>			0.1	0.3	V
Vertical external trigger load resistance	R <sub>TR</sub>		2.7	3.6		kΩ
Vertical automatic synchronization stop voltage	V <sub>SAS</sub>			1.9	2.4	V
Vertical output pulse start V <sub>CC</sub> voltage	S <sub>VV</sub>			3	4	V
Horizontal free-running frequency deviation	Δf <sub>H</sub>	Deviation from 15.734kHz	–90	30	150	Hz
Horizontal pull-in range	f <sub>H PULL</sub>	Deviation from 15.734kHz	±400	±550		Hz
Horizontal output pulse width	P <sub>WH OUT</sub>		21.8	23.8	25.8	μs
Horizontal output pulse phase	H <sub>PF</sub>		15	17	19	μs
	H <sub>PCEN</sub>		3.4	4.4	5.4	μs
	H <sub>PR</sub>		0	3	6	μs
Horizontal output pulse start V <sub>CC</sub> voltage	S <sub>HV</sub>			4.5	5.3	V
AFC II FBP peak voltage	F <sub>BPH</sub>		4.1	4.6	5.1	V
Burst gate pulse delay time	T <sub>d BGP</sub>		0.2	0.6	1.2	μs
Burst gate pulse width	P <sub>W BGP</sub>		2.7	3.7	4.7	μs
VCR SW input voltage	V <sub>CR</sub>			1.3	2.0	V
X-ray protector circuit operation input voltage	V <sub>HD</sub>		0.64	0.74	0.84	V
Horizontal synchronization detection	H <sub>coin</sub>		4.2	4.5	4.8	V
Threshold level						
Horizontal output current	H <sub>OUT</sub>	I <sub>CC</sub> = 13mA	3.8	4.7	5.5	mA

## Application Circuit Example



Unit (resistance: Ω, capacitance: F)

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