



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)

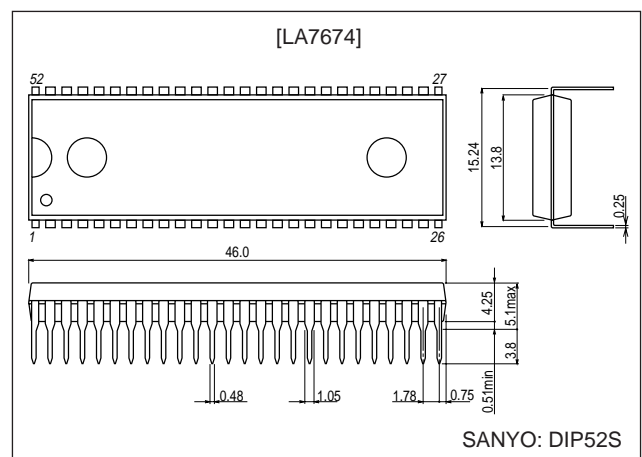
[Deflection]

- 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



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Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V11 max		11	V
	V14 max		11	V
Maximum supply current	I30max		16	mA
Allowable power dissipation	Pd max	$T_a \leq 60^\circ\text{C}$	1.35	W
Operating temperature range	Topr		-10 to +65	$^\circ\text{C}$
Storage temperature range	Tstg		-55 to +150	$^\circ\text{C}$
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 $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	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 $T_a = 25^\circ\text{C}$, $V_{CC} = V11 = V14 = 9\text{V}$, $I_{CC} = I30 = 13\text{mA}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Circuit Voltage and Current]						
Horizontal supply voltage	V30	$V_{CC} = 9\text{V}$, $I_{CC} = 13\text{mA}$	7.3	7.8	8.3	V
Supply current	I11 + 14	$V_{CC} = 9\text{V}$, $I_{CC} = 13\text{mA}$, I_F 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	$CW = 85\text{dB}\mu$, RFAGCVR = min	7.6	8.0	8.3	V
Minimum RFAGC voltage	V49L	$CW = 85\text{dB}\mu$, RFAGCVR = max	0	0.01	0.3	V
Input sensitivity	V_i	VIF input level for video output at 0.8Vp-p (40% mod).	33	39	45	dB μ
AGC range	GR	Maximum input ($V_0 = 0.8\text{Vp-p}$) - input sensitivity	54	62	70	dB
Maximum permissible input	V_i max	VIF input level for video output at +1dB	97	104	111	dB μ
Video output detection	V_{O44}	$V_i = 80\text{dB}\mu$, AM = 78% mod	1.7	2.0	2.3	Vp-p
Differential gain	DG	$V_i = 80\text{dB}\mu$, AM = 87.5%, video mod		3.0	10	%
Differential phase	DP	$V_i = 80\text{dB}\mu$, AM = 87.5%, video mod		1.0	10	DEG
Video S/N	S/N	$V_i = 80\text{dB}\mu$, 20 log $\frac{1.46 (Vp-p)}{\text{noise } (V_{rms})}$	47	54	61	dB
Synchronization signal tip level	V44 TIP	$CW = 80\text{dB}\mu$	2.1	2.4	2.7	V
Frequency characteristic	f_C	Frequency at video output of -3dB	6.0	9.0	12.0	MHz
920 kHz VIF intermodulation	I920	V3.58MHz/V920kHz, $V_i = 80\text{dB}\mu$	35	42	49	dB
Maximum AFT output voltage	V47H	$CW = 80\text{dB}\mu$, frequency change	8.3	8.7	9.0	V
Minimum AFT output voltage	V47L	$CW = 80\text{dB}\mu$, frequency change	0.1	0.3	0.8	V
AFT detection sensitivity	Sf	$CW = 80\text{dB}\mu$, frequency change	45	70	100	mV/kHz
AFT switch operation start voltage	V_{AFTSW}	Measuring with sweep signal	0.5	1.0	1.5	V
Black noise threshold level	V_{BTH}	Measuring with sweep signal	1.1	1.4	1.7	V
APC pull-in range (U)2	f_{PU-2}	$CW = 80\text{dB}\mu$, $f_P = 53\text{MHz}$ to 64MHz	0.8	1.7	4.0	MHz
APC pull-in range (L)2	f_{PL-2}	$CW = 80\text{dB}\mu$, $f_P = 53\text{MHz}$ to 64MHz		-2	-1	MHz
VCO maximum variable range	Δf_U	Quiescent	0.9	1.7	4.0	MHz
	Δf_L	Quiescent	-4	-2	-1	MHz
VCO control sensitivity	β	Quiescent	1.5	3.0	5.5	kHz/mV

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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[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
[SIF AF]						
SIF limiting voltage	Vi lim	SIF output level for detection output at -3dB	33	40	47	dB μ
FM detection output voltage	V _{O1}	Vi = 100dB μ , $\Delta f = \pm 25\text{kHz}$	440	550	670	mVrms
FM detection output distortion ratio	THD	Vi = 100dB μ , $\Delta f = \pm 25\text{kHz}$	0	0.4	1.0	%
AM rejection	AMR	Vi = 100dB μ , $\frac{\text{FM} : \Delta f = \pm 25\text{kHz}}{\text{AM} : 30\%}$	40	60	80	dB
AF amplifier voltage gain	G _{AF}	Vi = 100mVrms, f = 400Hz	18	20	22	dB
AF maximum output voltage	V _{O6 max}	Output level for AF amplifier output distortion at 10%	2.0	2.8	3.6	Vrms
AF electronic attenuator range	ATT	Vi = 200mVrms, f = 400Hz	70	80	100	dB
[Video]						
Black enhancement threshold	B _{STH}	APL variable	40	50	60	IRE
Maximum black enhancement gain	BS max	APL variable	-35	-27	-20	IRE
Soft video tone variable range	Δ Soft	f = 2MHz, 100mVp-p video tone VR: 4V \rightarrow 0V	-6	-4	-2	dB
Sharp video tone variable range	Δ Sharp	f = 2MHz, 100mVp-p video tone VR: 4V \rightarrow 9V, contrast VR: 6V	7	10	13	dB
Video voltage gain audio-visual Switch 9V	GV9V	f = 100kHz, 100mVp-p, contrast VR: 9V, video tone VR: 4V	15	18	21	dB
Video voltage gain audio-visual Switch 0V	GV0V	f = 100kHz, 100mVp-p, contrast VR: 0V, video tone VR: 4V	15	18	21	dB
Contrast control center	C _{CEN}	f = 100kHz, 100mVp-p, contrast VR: 6V	0.4	0.48	0.57	Vp-p
Contrast variable control range	Δ 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	$^{\circ}$ C
	A _{CCP2}	-20dB	-7	0	+7	$^{\circ}$ C
Killer operation point	E _K		-35	-28	-21	dB
Color control color residual	E _{C min}	Color VR: 0V, contrast VR: 9V			50	mVp-p
Color control center	E _{C CEN}	Color VR: 4.5V, contrast VR: 6V	1.2	1.8	2.4	Vp-p
Maximum demodulation output	E _{C max}	Color VR: 9V, contrast VR: 9V	3.2	4.0	4.8	Vp-p
Color contrast variable range	Δ 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	$^{\circ}$ C
Tint variable range	Δ T	Tint VR: 0V \leftarrow 4.5V \rightarrow 8V, color VR: 4.5V, contrast VR: 6V	± 40	± 55	± 70	$^{\circ}$ C
APC pull-in range	Δf_{APC}		± 300	± 500		Hz

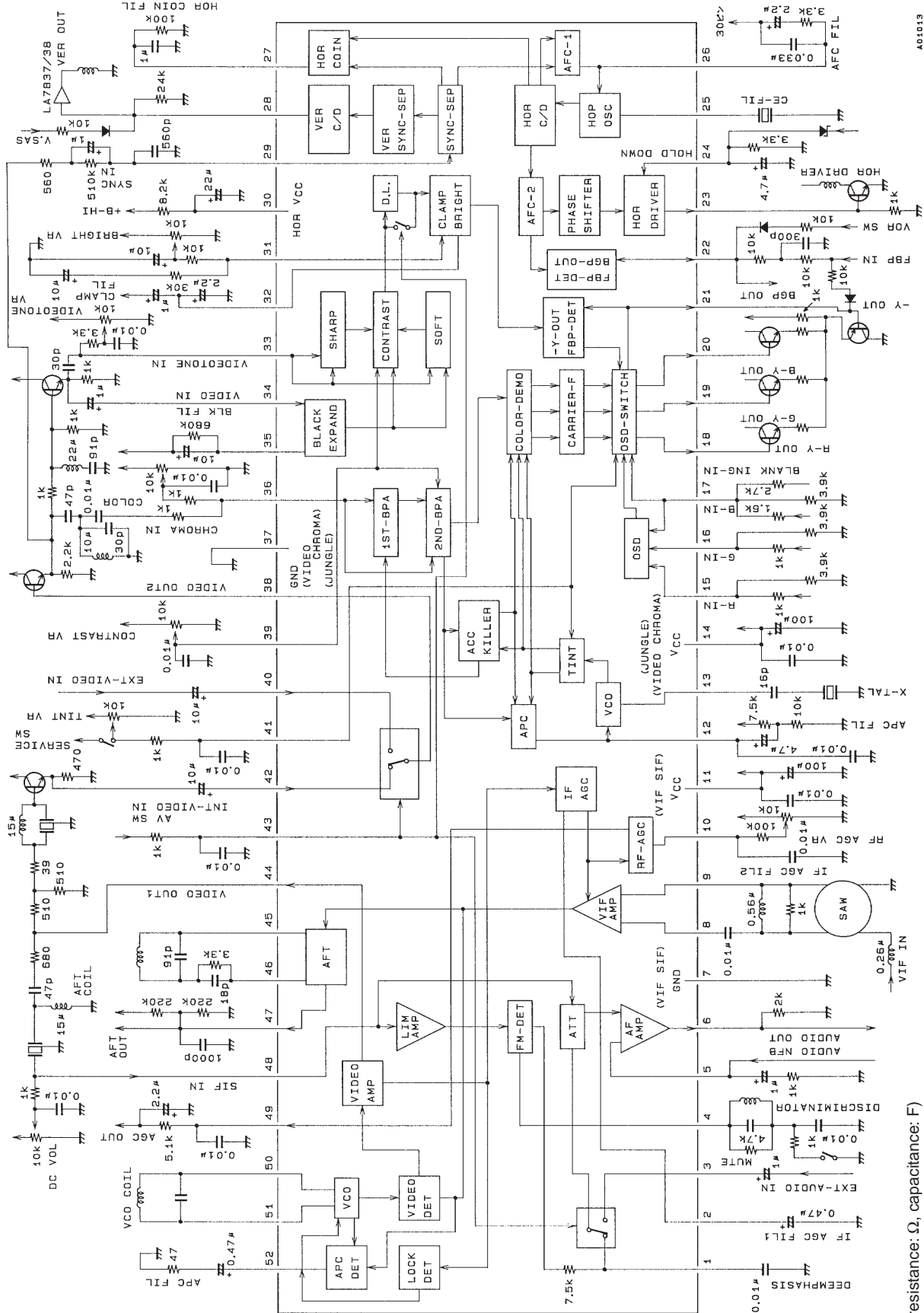
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Demodulator output ratio	R/B	Monochrome signal, contrast VR: 6V, color VR: B – Y = 1Vpo	0.81	0.90	0.98	
	G/B	Monochrome signal, contrast VR: 6V, color VR: B – Y = 1Vpo	0.24	0.30	0.38	
Demodulator phase angle	RB	Monochrome signal, contrast VR: 6V, color VR: B – Y = 1Vpo	97	105	113	DEG
	GB	Monochrome signal, contrast VR: 6V, color VR: B – Y = 1Vpo	-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	ΔV _{C-Y}	Burst signal only, color VR: 0V	-200	0	+200	mV
Demodulator output residual carrier	E car	Quiescent, killer off, color VR: 0V			0.05	Vp-p
[OSD]						
Blanking pulse threshold level	TH _{BL}	C – IN: color bar, B – IN: variable	0.5	0.8	1.1	V
- Y out DC voltage (OSD mode)	V _{-Y}	B-IN : 1.5V	2.5	2.8	3.1	V
RGB – in threshold level	TH _R	R – IN: variable, B – IN: 1.5V	1.9	2.2	2.5	V
	TH _G	G – IN: variable, B – IN: 1.5V				
	TH _B	B – IN, variable				
RGB – Y out DC voltage (3 V)	V _{R3V}	R, G, B – IN :3V	5.2	5.5	5.8	V
	V _{G3V}					
	V _{B3V}					
RGB – Y out DC voltage (4 V)	V _{R4V}	R, G, B – IN : 4V	5.7	6.0	6.3	V
	V _{G4V}					
	V _{B4V}					
RGB – Y out DC voltage (5 V)	V _{R5V}	R, G, B – IN : 5V	6.2	6.5	6.8	V
	V _{G5V}					
	V _{B5V}					
[Deflection]						
Synchronization separator input DC level	V _{SDC}		6.0	6.3	6.6	V
Vertical free-running period	T _{V free}		262	262.5	263	H
Maximum vertical synchronization period	T _{V max}	Input: horizontal synchronization signal only	296.5	297	297.5	H
Minimum vertical synchronization period	T _{V min}		224.5	225	225.5	H
Vertical blanking pulse width	P _{W VBL}		20.25	20.5	20.75	H
Vertical blanking pulse wave Height value	P _{H VBL}		7.0	7.5		V
Vertical output pulse width	P _{W VOUT}		8.25	8.5	8.75	H
Vertical output voltage	V _{OUT H}		5.7	6	6.3	V
	V _{OUT M}		4.2	4.5	4.8	V
	V _{OUT L}			0.1	0.3	V
Vertical external trigger load resistance	R _{TR}		2.7	3.6		kΩ
Vertical automatic synchronization stop voltage	V _{SAS}			1.9	2.4	V
Vertical output pulse start V _{CC} voltage	S _{VV}			3	4	V
Horizontal free-running frequency deviation	Δf _H	Deviation from 15.734kHz	-90	+30	+150	Hz
Horizontal pull-in range	f _{H PULL}	Deviation from 15.734kHz	±400	±550		Hz
Horizontal output pulse width	P _{WH OUT}		21.8	23.8	25.8	μs
Horizontal output pulse phase	H _{PF}		15	17	19	μs
	H _{PCEN}		3.4	4.4	5.4	μs
	H _{PR}		0	3	6	μs
Horizontal output pulse start V _{CC} voltage	S _{HV}			4.5	5.3	V
AFC II FBP peak voltage	F _{BPH}		4.1	4.6	5.1	V
Burst gate pulse delay time	T _{d BGP}		0.2	0.6	1.2	μs
Burst gate pulse width	P _{W BGP}		2.7	3.7	4.7	μs
VCR SW input voltage	V _{CR}			1.3	2.0	V
X-ray protector circuit operation input voltage	V _{HD}		0.64	0.74	0.84	V
Horizontal synchronization detection Threshold level	H _{coin}		4.2	4.5	4.8	V
Horizontal output current	H _{OUT}	I _{CC} = 13mA	3.8	4.7	5.5	mA

Sample Application Circuit



AO1013

Unit (resistance: Ω, capacitance: F)

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