



SANYO Semiconductors

DATA SHEET

LA76814 — Monolithic Linear IC For NTSC Color Television Sets VIF/SIF/Y/C/Deflection Implemented in a Single Chip

Overview

LA76814 is VIF/SIF/Y/C/Deflection implemented in a single chip for NTSC color television sets.

Functions

- VIF/SIF/Y/C/Deflection implemented in a single chip.
- I²C bus control.

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V ₈ max		7.0	V
	V ₄₃ max		7.0	V
Maximum supply current	I ₁₈ max		25	mA
	I ₂₅ max		35	mA
Allowable power dissipation	P _d max	Ta ≤ 65°C *	1.5	W
Operating temperature	T _{opr}		-10 to +65	°C
Storage temperature	T _{stg}		-55 to +150	°C

*: When mounted on a 114.3×76.1×1.6 mm³ glass epoxy board

Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V ₈		5.0	V
	V ₄₃		5.0	V
Recommended supply current	I ₁₈		19	mA
	I ₂₅		27	mA
Operating supply voltage range	V ₈ op		4.7 to 5.3	V
	V ₄₃ op		4.7 to 5.3	V
Operating supply current range	I ₁₈ op		17 to 21	mA
	I ₂₅ op		24 to 30	mA

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Electrical Characteristics $T_a = 25^\circ\text{C}$, $V_{CC} = V_8 = V_{43} = 5.0\text{V}$, $I_{CC} = I_{18} = 19\text{mA}$, $I_{CC} = I_{25} = 27\text{mA}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit voltage, current						
IF supply current	I_8	$V_8 = 5\text{V}$, $V_3 = 2.5\text{V}$		61.0		mA
RGB supply voltage	V_{18}	$I_{18} = 19\text{mA}$		8.0		V
Horizontal supply voltage	V_{25}	$I_{25} = 27\text{mA}$		5.0		V
Video supply current	I_{43}	$I_{43} = 5\text{V}$		94.0		mA
VIF block						
Maximum RFAGC voltage	VRFH	CW = 80dB μ , DAC = 0	8.5	9.0		Vdc
Minimum RFAGC voltage	VRFL	CW = 80dB μ , DAC = 63	0.0	0.3	0.7	Vdc
RF AGC Delay Pt (@DAC = 0)	RFAGC0	DAC = 0	85			dB μ
RF AGC Delay Pt (@DAC = 63)	RFAGC63	DAC = 63			75	dB μ
Input sensitivity	V_i	Output-3db		43	46	dB μ
No-signal video output voltage	VO _n	No signal	3.3	3.7	4.1	Vdc
Sync signal tip level	VO _{tip}	CW = 80dB μ	1.1	1.4	1.7	Vdc
Video output amplitude	VO	80dB μ , AM = 78%, fm = 15kHz	1.9	2.0	2.1	Vp-p
Video S/N	S/N	CW = 80dB μ	45	49		dB
C-S beat level	IC-S	V3.58MHz/V920kHz	40	45		dB
Differential gain	DG	80dB μ , 87.5% Video MOD		5.0	10.0	%
Differential phase	DP	80dB μ , 87.5% Video MOD		2.0	10.0	deg
Maximum AFT output voltage	VAFTH	CW = 80dB μ , frequency variations	4.3	4.7	5.0	Vdc
Minimum AFT output voltage	VAFTL	CW = 80dB μ , frequency variations	0.0	0.2	0.7	Vdc
AFT detection sensitivity	VAFTS	CW = 80dB μ , frequency variations	18.0	28.0	38.0	mV/kHz
APC pull-in range (U)	fPU		1.0			MHz
APC pull-in range (L)	fPL		1.0			MHz
SIF block						
FM detection output voltage	SOADJ			620		mVrms
FM limiting sensitivity	SLS	Output -3dB		47	55	dB μ
FM detection output f characteristics	SF	fm = 100kHz	-0.5		3.0	dB
FM detection output distortion	STHD	FM = $\pm 25\text{kHz}$			1.0	%
AM rejection ratio	SAMR	AM = 30%	40			dB
SIF S/N	SSN	DIN.Audio	57	61		dB
de-emph time constant	SNTC		2.0	3.0	4.0	dB
BPF band characteristics	SBW			1.5		dB
AUDIO block						
Maximum gain	AGMAX	1kHz	-2.5	0.0	2.5	dB
Variable range	ARANGE		60	65		dB
Frequency characteristics	AF	20kHz	-3.0	0.0	3.0	dB
Mute	AMUTE		70	75		dB
Distortion	ATHD	1kHz, 400mVrms, Vol: MAX			0.5	%
S/N	ASN	DIN.Audio	65	70		dB
Crosstalk	ACT		70	75		dB
Chroma block						
ACC amplitude characteristics 1	ACCM1_N	Input: +6dB/0dB 0dB = 40IRE	0.8	1.0	1.2	deg
ACC amplitude characteristics 2	ACCM2_N	Input: -14dB/0dB	0.7	1.0	1.1	deg
B-Y/Y amplitude ratio	CLRBY		80	100	150	%
Color control characteristics 1	CLRMN	Color MAX/CEN	1.6	1.8	2.2	deg
Color control characteristics 2	CLRMM	Color MAX/MIN	30	45	70	dB
Color control sensitivity	CLRSE		1	1.4	4	%/bit
Tint center	TINCEN		-10	0	10	deg
Tint variable range (+)	TINT+		35			deg
Tint variable range (-)	TINT-				-35	deg

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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Demodulation output ratio R-Y/B-Y	RB_N	R-Y/B-Y_Angle_DAC	0.80	0.90	1.00	deg
Demodulation output ratio G-Y/B-Y	GB_N	R-Y/B-Y_Angle_DAC	0.24	0.30	0.36	deg
Demodulation angle R-Y/B-Y	ANGRB_N	R-Y/B-Y_Angle_DAC = Center	95	105	115	deg
Demodulation angle G-Y/B-Y	ANGGB_N	R-Y/B-Y_Angle_DAC = Center	-130	-118	-100	deg
Killer operating point	KILL_N	0dB = 40IRE	-41	-35	-29	dB
APC pull-in range (+)	PULIN+_N		350			Hz
APC pull-in range (-)	PULIN-_N				-350	Hz
Residual higher harmonic level B	E_CAR_B				300	mVp-p
Residual higher harmonic level R	E_CAR_R				300	mVp-p
Residual higher harmonic level G	E_CAR_G				300	mVp-p
OSD block						
OSD Fast SW threshold	FSTH		1.7	2	2.5	V
Red RGB output level	ROSDC			100		IRE
Green RGB output level	GOSDC			100		IRE
Blue RGB output level	BOSDC			100		IRE
Analog OSD R output amplitude gain match	R_RGB		0.8	1	1.2	Ratio
Analog OSD G output amplitude gain match	G_RGB		0.8	1	1.2	Ratio
Analog OSD B output amplitude gain match	B_RGB		0.8	1.0	1.2	Ratio
RGB output (cutoff drive) block						
Brightness control	Normal	BRT63	1.8	2.15	2.5	V
	Hi brightness (max)	BRT127	15	20	25	IRE
	Low brightness (min)	BRT0	-25	-20	-15	IRE
Cutoff control (min)	Vbias0		1.8	2.2	2.6	V
(Bias control) (max)	Vbias255		2.8	3.2	3.6	V
Resolution	Vbiassns			4		mV/Bit
Sub-bias control Resolution	Vsbiassns			8		mV/Bit
Drive adjustment Maximum output (R, B)	RBout127			2.5		Vp-p
Drive adjustment Maximum output (G)	Gout15			2.15		Vp-p
Output attenuation (R, B)	RBout0		7	9	11	dB
Output attenuation (G)	Gout0		3	5	7	dB
Gamma correction	RGB γ		78	85	92	IRE
Video SW block						
Video signal input 1DC voltage	VIN1DC		2.2	2.5	2.8	V
Video signal input 1AC voltage	VIN1AC			1		Vp-p
Video signal input 2DC voltage	VIN2DC		2.2	2.5	2.8	V
Video signal input 2AC voltage	VIN2AC			1		Vp-p
SVO terminal DC voltage	SVODC		1.7	2	2.3	V
SVO terminal AC voltage	SVOAC		1.7	2	2.3	Vp-p

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Parameter	Symbol	Conditions	Ratings			Unit		
			min	typ	max			
Filter block								
Chroma trap amount NTSC	Ctrap	SHARPNESS = 0	-36.0	-26.0	-22.0	dB		
C-BPF1A (3.08MHz)	CBP308	Reference: 3.58MHz	-5.0	-1.5	0.0	dB		
C-BPF1B (3.88/3.28MHz)	CBP03	Reference: 3.28MHz	-2.0	0.0	2.0	dB		
C-BPF1C (4.08/3.08MHz)	CBP05	Reference: 3.08MHz	-3.0	0.0	3.0	dB		
Y-DL TIME1 S-VHS	TdY1	FILTER SYS = 100	300.0	350.0	400.0	ns		
Y-DL TIME3 NTSC	TdY3	FILTER SYS = 000	530.0	580.0	630.0	ns		
Video block								
Video overall gain (Contrast max)	CONT127		9.0	11.0	13.0	dB		
Contrast adjustment Characteristics	Normal/max	CONT63	-7.5	-6.0	-4.5	dB		
	Min/max	CONT0	-15.0	-12.0	-9.0	dB		
Sharpness variability range	Normal	Sharp16	F = 2.2MHz, FILTER SYS = 0000		5.0	8.0	11.0	dB
	Max	Sharp31	F = 2.2MHz, FILTER SYS = 0000		9.0	12.0	14.0	dB
	Min	Sharp0	F = 2.2MHz, FILTER SYS = 0000		-4.0	-1.0	2.0	dB
Maximum black stretch gain	BKSTmax		20.0	25.0	30.0	IRE		
Black stretch threshold (60IRE Δ black)	BKSTTH		-5.0	0.0	5.0	IRE		
DC transmission amount	ClampG		95.0	100.0	105.0	%		
Horizontal/vertical blanking output level	RGBBLK		0.1	0.4	0.7	V		
Video frequency characteristics 1 S-VHS	BW1	7.0MHz/100kHz	-6.0	-3.0	-1.0	dB		
Video frequency characteristics 3 NTSC	BW3	2.6MHz/100kHz	-6.0	-3.0	-1.0	dB		
Deflection block								
Horizontal free-running frequency	fH		15600	15734	15850	Hz		
Horizontal pull-in range	fH PULL		\pm 400			Hz		
Horizontal output pulse width	Hduty		36.1	37.6	39.1	μ s		
Horizontal output pulse saturation voltage	V Hsat		0	0.2	0.4	V		
Vertical free-running frequency 60	VFR60		262.0	262.5	263.0	H		
Horizontal output pulse phase	HPHCEN		9.5	10.5	11.5	μ s		
Horizontal position adjustment range	HPHrange	5bit		\pm 2.2		μ s		
Horizontal position adjustment maximum variability width	HPHstep				200.0	ns		
POR circuit operating voltage	VPOR		3.70	4.00	4.30	V		
Horizontal blanking	Left @0	BLKL0	BLKL: 000		7500	8300	9100	ns
	Left @7	BLKL7	BLKL: 111		10800	11600	12400	ns
	Right @0	BLKR0	BLKR: 000		1800	2600	3400	ns
	Right @7	BLKR7	BLKR: 111		-1100	-300	500	ns
Sand castle	Pulse crest value H	SANDH		5.3	5.6	5.9	V	
	Pulse crest value M1	SANDM1		3.7	4.0	4.3	V	
	Pulse crest value L	SANDL		0.1	0.4	0.7	V	
Burst gate pulse	Width	BGPWD		3.5	4.0	4.5	μ s	
	Phase	BGPPH		4.9	5.4	5.9	μ s	
X-ray protection circuit operating voltage	VXRAY		0.59	0.69	0.79	V		

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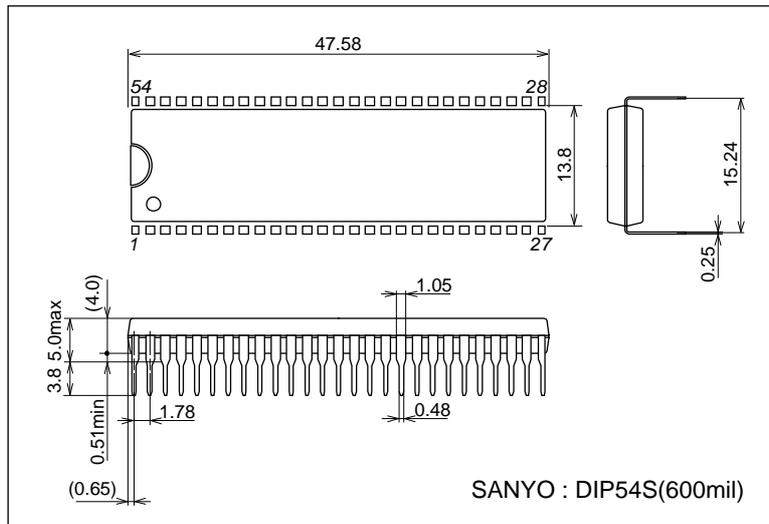
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Parameter	Symbol	Conditions	Ratings			Unit	
			min	typ	max		
Vertical screen size compensation							
Vertical ramp output amplitude	NTSC@64	Vsnt64	VSIZE: 1000000	0.75	0.85	0.95	Vp-p
	NTSC@0	Vsnt0	VSIZE: 0000000	0.40	0.50	0.60	Vp-p
	NTSC@127	Vsnt127	VSIZE: 1111111	1.05	1.20	1.35	Vp-p
High-voltage dependent vertical size correction							
Vertical size correction @0	Vsizecomp	VCOMP: 000	0.83	0.88	0.93	ratio	
Vertical screen position adjustment							
Vertical ramp DC voltage	NTSC@32	Vdcnt32	VDC: 100000	2.25	2.40	2.55	Vdc
	NTSC@0	Vdcnt0	VDC: 000000	1.85	2.00	2.15	Vdc
	NTSC@63	Vdcnt63	VDC: 111111	2.65	2.80	2.95	Vdc
Vertical linearity	@16	Vlin16	VLIN: 10000	0.85	1.00	1.15	ratio
	@0	Vlin0	VLIN: 00000	1.17	1.32	1.47	ratio
	@31	Vlin31	VLIN: 11111	0.57	0.72	0.87	ratio
Vertical S-shaped correction	@16	VScor16	VSC: 10000	0.55	0.70	0.85	ratio
	@0	VScor0	VSC: 00000	0.85	1.00	1.15	ratio
	@31	VScor31	VSC: 11110	0.36	0.51	0.66	ratio
AKB							
AKB DC threshold	AKBDC		2.2	2.5	2.8	V	

Package Dimensions

unit : mm

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Test Conditions $T_a = 25^{\circ}\text{C}$, $V_{CC} = V_8 = V_{43} = 5.0\text{V}$, $I_{CC} = I_{25} = 27\text{mA}$.

Circuit voltage, current

Parameter	Symbol	Test point	Input signal	Test method	Bus conditions
Horizontal supply voltage	HV_{CC}	25		Apply a current of 27mA to pin 25 and measure the voltage at pin 25.	Initial
IF supply current	I_8	8	No signal	Apply a voltage of 5.0V to pin 43 and measure the incoming DC current [mA].	Initial
Video/vertical supply current	I_{43}	43		Apply a voltage of 5.0V to pin 43 and measure the incoming DC current [mA].	Initial