

SANYO

No.2917

LA7655NMonolithic Linear IC
1-Chip IC for Color TV Signal Processing

The LA7655N, being a single-chip IC for NTSC color TV use, is a performance-improved version of the single-chip IC LA7650K heretofore in use and incorporates a circuit to process all types of signals (VIF, SIF, video, chroma, deflection) for color TVs based on the NTSC system. In designing this IC, its basic characteristics including synchronization performance are greatly improved, and taking into consideration its needed application in AV equipment such as VTRs, the necessity of adjustment is substantially reduced. Also, the number of components is reduced, and the element is made compact to achieve DIP42S (shrink type). A simple, compact color TV can be implemented by simply connecting a tuner, power supply, and output circuit to the LA7655N.

When using the LA7655N in conjunction with vertical output-use IC LA7835/7836, only one connection (vertical timing pulse) is required, with no connection required for feedback, thus simplifying layout of printed circuit pattern.

Single-chip IC variations on mother type LA7655N are available as shown in Table 1. Various needs such as improvement in performance or functions of color TV sets can be met by using these single-chip ICs in conjunction with peripheral ICs shown in Table 2.

Features

- Small-sized package
- Minimum number of external parts required
- VIF·SIF
 - Excellent buzz beat characteristics
 - High-gain VIF amplifier eliminating the need for a preamplifier
 - AGC speed can be increased.
- Video/audio simultaneous muting, or audio-only muting possible
- Video-Chroma
 - A quadratic differentiation circuit allowing soft video tone operation is also incorporated.
 - Adjustment-free chroma sync
 - The LA7690 (flash color corrector IC) can be connected to the LA7655N.
- Deflection
 - Adjustment-free horizontal, vertical sync
 - Dual AFC system with excellent horizontal noise characteristics
 - Vertical sync stabilizing circuit which is scarcely affected by motor noise.

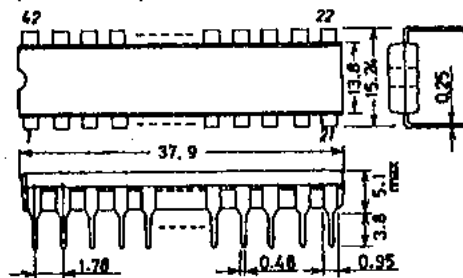
Maximum Ratings at $T_a = 25^\circ\text{C}$

Maximum Supply Voltage	V_0 max	12	V
	V_{11} max	12	V
Maximum Supply Current	I_{20} max	16	mA
Allowable Power Dissipation	P_d max	1.3	W
Operating Temperature	T_{opg}	-10 to +65	$^\circ\text{C}$

$T \leq 65^\circ\text{C}$

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The application circuit diagrams and circuit constants herein are included as an example and provide no guarantee for designing equipment to be mass-produced. The information herein is believed to be accurate and reliable. However, no responsibility is assumed by SANYO for its use; nor for any infringements of patents or other rights of third parties which may result from its use.

Case Outline 3025B-D42SIC
(unit: mm)

SANYO: DIP42S

Specifications and information herein are subject to change without notice.

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N308Y'T, TS No.2917-1/6

LA7655N

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			unit
Storage Temperature	Tstg	-55 to +125	°C
Circuit Current	I ₃₆ max	-6	mA
	I ₄ max	-3	mA
FBP Input Current	I ₂₁ max	5	mA
	I ₁₉ max	10	mA

Operating Conditions at Ta = 25°C

			unit
Recommended Supply Voltage	V ₉	9	V
	V ₁₁	9	V
Recommended Supply Current	I ₂₀	13	mA
Operating Voltage Range	V _{9 op}	8 to 10	V
	V _{11 op}	8 to 10	V
Operating Current Range	I _{20 op}	10 to 16	mA

Operating Characteristics at Ta = 25°C, V_{CC} = V₉ = V₁₁ = 9V, I_{CC} = I₂₀ = 13mA

[Circuit Voltage, Current]			min	typ	max	unit
Horizontal Supply Voltage	V ₂₀	V _{CC} = 9V, I _{CC} = 13mA	7.3	7.8	8.3	V
Supply Current	I ₉ + I ₁₁	V _{CC} = 9V, I _{CC} = 13mA	67	93	124	mA
[VIF] f _p = 58.75MHz						
Video Detector DC Output Voltage	V ₃₆	Quiescent	4.2	4.6	5.0	V
AFT Output Voltage	V ₃₈	Quiescent	2.8	4.2	5.7	V
Maximum RF AGC Control Voltage	V _{40H}	CW = 85dBμ, RF AGC VR = min	7.6	8.0	8.3	V
Minimum RF AGC Control Voltage	V _{40L}	CW = 85dBμ, RF AGC VR = max	0	0.01	0.3	V
VIF Input Sensitivity	V _i	VIF input level at which video output is 0.8Vp-p (40% MOD).	30	36	42	dBμ
VIF AGC Control Range	GR	Maximum input (V ₀ = 0.8Vp-p) - input sensitivity	62	70		dB
[VIF Maximum Permissible Input	V _i max	VIF input level at which video output is +1dB.	102	110		dBμ
Video Detector Output	V _{O36}	V _i = 80dBμ, AM = 78% MOD	1.7	2.0	2.3	Vp-p
Differential Gain	DG	V _i = 80dBμ, 87.5%, VIDEO MOD	3.0	10		%
Differential Phase	DP	V _i = 80dBμ, 87.5%, VIDEO MOD	3.0	10		deg
Video S/N	S/N	V _i = 80dBμ, AM = 78% MOD	47	53		dB
		CW				
Sync-Tip Level	V ₃₆ TIP	CW = 80dBμ	2.0	2.3	2.6	V
[Video Frequency Characteristic	f _c	Frequency at which video output is down 3dB.	5.0	7.0		MHz
VIF Intermodulation	I ₉₂₀	V _{3.58} MHz/V ₉₂₀ kHz, V _i = 80dBμ	28	35		dB
Maximum AFT Control Voltage	V _{36H}	CW = 80dBμ, frequency change	8.2	8.6	8.9	V
Minimum AFT Control Voltage	V _{36L}	CW = 80dBμ, frequency change	0.1	0.3	0.8	V
AFT Detector Sensitivity	Sf	CW = 80dBμ, frequency change	50	80	120mV/kHz	
AFT Switch Operation Start Voltage	V _{AFT SW}	Test with sweep signal.	1.0	5.0		V
Black Noise Threshold Level	V _{BTH}	Test with sweep signal.	1.2	1.5	1.8	V
White Noise Threshold Level	V _{WTH}	Test with sweep signal.	4.9	5.3	5.7	V
[SIF.AF] f _s = 4.5MHz						
Sound D Input Limiting Sensitivity	V _{ilim}	SIF input level at which detection output is down 3dB.		48	55	dBμ

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LA7655N

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FM Detector Output Voltage	V _{O1}	V _i = 100dB _μ , Δf = ±25kHz	380	650	750	mVrms
FM Detector Output Distortion	THD	V _i = 100dB _μ , Δf = ±25kHz		0.4	1.0	%
AM Rejection	AMR	V _i = 100dB _μ , $\frac{FM:\Delta f = \pm 25k}{AM:30\%}$	40	53		dB
AF Amp Voltage Gain	G _{AF}	V _i = 100mVrms, f = 400Hz	18	20	22	dB
AF Maximum Output Voltage	V _{O4 max}	Output level at which AF amp output distortion is 10%	2.0	3.0		Vrms
AF Electronic Attenuator Range	A _{AT}	V _i = 200mVrms, f = 400Hz	70	80		dB
[Video]						
Soft Video Tone Variable Range	ΔSoft	f = 2MHz, 100mVp-p, video tone VR: 4V → 9V	-6	-4	-2	dB
Sharp Video Tone Variable Range	ΔSharp	f = 2MHz, 100mVp-p, video tone VR: 4V → 9V	8	11	14	dB
Video Voltage Gain	GV	f = 100kHz, 100mVp-p, contrast VR: 9V, video tone VR: 4V	17	20	23	dB
Contrast Control Center	C _{CEN}	f = 100kHz, 100mVp-p, contrast VR: 6V	0.45	0.57	0.69	Vp-p
Contrast Variable Range	ΔCV	Contrast VR: 3V → 9V	19	21	23	dB
Bright Control	B _{RI1}	Bright VR: 2V	5.8			V
	B _{RCEN}	Bright VR: 4.5V	2.6	3.1	3.6	V
	B _{RI2}	Bright VR: 7V			1.2	V
Frequency Response	f _v	Contrast VR: 6V, video tone VR: 4V, 3dB down	5	7		MHz
DC Transmission	R _{DC}	Input: stair step signal, 200mVp-p	88	93		%
[Chroma]						
ACC Amplitude Characteristics	ACC1	+6dB	-3	0	+3	dB
	ACC2	-20dB	-7		+2	dB
ACC Phase Characteristics	ACCP1	+6dB	-3	0	+3	deg
	ACCP2	-20dB	-7		+7	deg
Killer Operating Point	E _K		-51	-44	-37	dB
Color Control Minimum	EC min	Color VR: 0V, Contrast VR: 9V				30 mVp-p
Color Residue	EC max	Color VR: 9V, contrast VR: 9V	4.0	5.0		Vp-p
Color Control Center	EC _{CEN}	Color VR: 4.5V, Contrast VR: 6V	1.6	2.4	3.2	Vp-p
Minimum Demodulator Output	ACC	Color VR: B-Y = 2.5mVp-p, contrast VR: 3V → 9V	17.5	19	20.5	dB
Contrast Color Variable Range	T _{CEN}	Tint VR: 4.5V, color VR: 4.5V, contrast VR: 6V	-16	-4	+8	deg
Tint Control Center	ΔT	Tint VR: 0V ← 4.5V → 9V, color VR: 4.5V, contrast VR: 6V	±40			deg
Tint Variable Range	Δf _{APC}		±350			Hz
APC Pull-In Range	R/B	Monochrome signal, contrast VR: 6V, color VR: B-Y = 1Vp-p	0.81	0.90	0.98	times
Demodulator Output Ratio	G/B	Monochrome signal, contrast VR: 6V, color VR: B-Y = 1Vp-p	0.24	0.30	0.38	times

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LA7655N

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			min	typ	max	unit
Demodulator Phase Angle	$\angle R_B$	Monochrome signal, contrast VR:6V, color VR:B-Y=1V _{po}	97	105	113	deg
	$\angle G_B$	Monochrome signal, contrast VR:6V, color VR:B-Y=1V _{po}	-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 Offset Voltage	ΔV_{C-Y}	Burst signal only, color VR:0V	-300	0	+300	mV
Dependence of Demodulation Output on V_{CC}	ΔE_C	$V_{CC}=9V \pm 1V$	0	10	20	%/V
Residual Carrier	E_{car}	Quiescent, killer OFF, color VR:0V			0.3	V _{p-p}
[Deflection]						
Sync Separator Input DC Level	VS DC		6.0	6.3	6.6	V
Vertical Free-Running Period	TV max	Input: horizontal sync signal only	296.5	297	297.5	H
Vertical Minimum-Running Period	TV min		224.5	225	225.5	H
Vertical Blanking Pulse Width	$P_{W VBL}$		17.25	17.5	17.75	H
Vertical Blanking Pulse Voltage	$P_{H VBL}$		7.0	7.5		V
Vertical Output Pulse Width	$PW V_{OUT}$		8.25	8.5	8.75	H
Vertical Output Pulse Voltage	$V_{OUT H}$		5.7	6	6.3	V
	$V_{OUT M}$		4.2	4.5	4.8	V
	$V_{OUT L}$				0.3	V
Vertical External Trigger Load Resistance	R_{TR}		2.7	3.6		k Ω
Vertical Automatic Synchronizer Stop Voltage	V_{SAS}			1.9	2.4	V
Vertical Operation Start Voltage	S_{VV}				4	V
Horizontal Free-Running Frequency Deviation	Δf_H	Deviation from 15.734kHz	-70	30	130	Hz
Dependence of Horizontal Free-Running Frequency on V_{CC}	$\Delta f_H V_{CC}$	$V_{20}=6.7V$ reference value			2	Hz
Horizontal Sync Pull-in Range	$f_{H PULL}$	Deviation from 15.734kHz	± 400			Hz
Horizontal Output Pulse Width	$P_{WH OUT}$		21.8	23.8	25.8	μs
Horizontal Output Pulse Phase	H_{PF}		13	15		μs
	$H_{P CEN}$		3.4	3.9	5.4	μs
	H_{PR}				0	μs
Horizontal Operation Start Voltage	S_{HV}			4.3	5	V
AFC II FBP Peak Voltage	F_{BPF}		3.3	3.9	4.5	V
Burst Gate Pulse Delay Time	$T_{d BGP}$		0.2	0.6	1.2	μs
Burst Gate Pulse Width	PW_{BGP}		2.7	3.7	4.7	μs
VCR SW Input Voltage	VCR			0.65	1.3	V
X-ray Protector Operation Voltage	V_{HD}		0.55	0.65	0.75	V

LA7655N

Single-chip ICs (Table 1)

	LA7655N	LA7651P		LA7652N	
		Pin 4 open	Pin 4 GND		
Applications	<ul style="list-style-type: none"> · Mother type · Suited for general-purpose CTV 	<ul style="list-style-type: none"> · High-grade AV set 	<ul style="list-style-type: none"> · Intended for standard base band interface of CATV 	<ul style="list-style-type: none"> · Making use of video signal during vertical blanking period (ex. automatic kine-bias) 	
(Features)	<ul style="list-style-type: none"> · Quadratic differentiation input polarity · Vertical blanker · Black noise canceler · Screen brightness at no video signal input mode · IF AGC · ATT & AF amp 	<ul style="list-style-type: none"> Positive With With ※1 Dark With With 	<ul style="list-style-type: none"> Negative With With ※2 Bright With Without 	<ul style="list-style-type: none"> Negative With Without ※3 Bright Without Without 	<ul style="list-style-type: none"> Positive Without With Dark With With
Remarks	<ul style="list-style-type: none"> · Advanced model of LA7650K · Pin-compatible with LA7650K, with no change required in applications 	<ul style="list-style-type: none"> · Quadratic differentiation possible using external TR,L,C 	<ul style="list-style-type: none"> · Can be used in conjunction with base band interface IC LA7970 to satisfy EIA IS-15. 	<ul style="list-style-type: none"> · Vertical blanker removed for applications where video signal is required during vertical blanking period (ex. automatic kine-bias) 	
Availability of sample (Schedule)	Available	January, 1989		Unfixed	

*1 Brightness uncontrollable. Can be made brighter by using an external circuit.

*2 Brightness controllable

*3 For availability of sample, contact our sales department.

Peripheral ICs (Table 2)

	Applications	Package	Features
LA7510	Quasi-parallel 1st SIF	SEP9	<ul style="list-style-type: none"> · Quasi-parallel circuit configuration can be implemented simply by connecting a very small-sized SEP9.
LA7970	CATV base band interface	DIP24S	<ul style="list-style-type: none"> · Can be used in conjunction with LA7651P to satisfy complicated EIA IS-15 easily.
LA7696	ON-screen display interface	DIP20S	<ul style="list-style-type: none"> · External input... R,G,B graphic input (TTL level) · Black border function to make characters clear · Auto green circuit
LA7760 LA7761	US stereo decoder	DIP30S DIP28S	<ul style="list-style-type: none"> · US bilingual, stereo decoder
LA7952 LA7953 and others	AV switch	SEP9 to DIP30S	<ul style="list-style-type: none"> · Switch IC for external input
LA7835 LA7836	Vertical output	SEP13II	<ul style="list-style-type: none"> · Selected according to CRT size. Vertical output with ramp generator LA7835 1.8Ap-p LA7836 2.2Ap-p