



SANYO Semiconductors

## DATA SHEET

# LA76604M — Monolithic Linear IC Video Signal Y/C Separator IC

## Overview

The LA76604M separates a video signal into Y and C components. It includes an on-chip 2H CCD delay line and achieves a significant reduction in flicker and noise by using a 3-line Y/C separation circuit.

## Functions

- For Y/C Separate (Digital Clocked CCD 3Line Comb Filter).

## Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply rating	$V_{CC\ max}$		6.0	V
Allowable power dissipation	$P_d\ max$	$T_a \leq 65^\circ\text{C}$	420*	mW
Operating temperature	$T_{opr}$		-10 to +65	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

\* Mounted on a 114.3×76.1×1.6mm glass epoxy 4-layer circuit board

**Operating Conditions** at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		5.0	V
Allowable operating supply voltage range	$V_{CC\ opg}$		4.8 to 5.2	V

■ Any and all SANYO Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO Semiconductor representative nearest you before using any SANYO Semiconductor products described or contained herein in such applications.

■ SANYO Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor products described or contained herein.

**SANYO Semiconductor Co., Ltd.**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

# LA76604M

## Electrical Characteristics at Ta = 25°C, VCC = 5.0V

Parameter	Symbol	Input	Output	Conditions	Ratings			Unit
					min	typ	max	
Analog Supply Current	I <sub>CC</sub>			Measure the current at 5PIN.	25	30	35	mA
Digital Supply Current	I <sub>DD</sub>			Measure the current at 6PIN.	25	30	35	mA
REG Voltage	REG		T7	Measure the output voltage.	3.8	4	4.2	V
VCO Voltage	VCO		T8	Measure the output voltage.	2.1	2.3	2.5	V
RD Voltage	RD		T12	Measure the output voltage.	9	10	11	V
PLL Voltage	PLL		T13	Measure the output voltage.	3	3.5	4	V
YIN1 Input Level	Y <sub>IN1</sub>	T14A	T14	VIN = 1Vp-p, Video signal SW2:2 Measure the input level.	0.8	1	1.2	Vp-p
YIN2 Input Level	Y <sub>IN2</sub>	T3A	T3	VIN = 1Vp-p, Video signal SW2:1 Measure the input level.	0.8	1	1.2	Vp-p
Chroma Input Level	C <sub>IN</sub>	T1A	T1	VIN = 0.7Vp-p, Chroma signal Measure the input level.	0.5	0.7	0.9	Vp-p
FSC Input Level	FSC <sub>IN</sub>	T11A	T11	VIN = 0.3Vp-p, SIN Signal Measure the input level.	0.2	0.3	0.5	Vp-p
Yout Level 1 (COMB Mode)	Y <sub>LVC</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:2 Measure the output level.	0.89	1	1.12	Vp-p
Yout Level 2 (THR Mode)	Y <sub>LVT</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:1 Measure the output level.	0.89	1	1.12	Vp-p
Yout f-Character (COMB Mode)	Y <sub>FC1</sub>	T14A T3A	T16	VIN = 1Vp-p, 5MHz, CW signal SW1:2 Measure the Gain between the input and the output.	-3	0	3	dB
Yout f-Character (COMB Mode)	Y <sub>FC2</sub>	T14A T3A	T16	VIN = 1Vp-p, 7MHz, CW signal SW1:2 Measure the Gain between the input and the output.		-20	-15	dB
Yout f-Character (THR Mode)	Y <sub>FT</sub>	T14A T3A	T16	VIN = 1Vp-p, 10MHz, CW signal SW1:1 Measure the Gain between the input and the output.	-3	0	3	dB
Y Signal Delay 1 (COMB Mode)	Y <sub>DLYC</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:2 Measure the delay between the input and the output of Y signal.	200	400	600	ns
Y Signal Delay 2 (THR Mode)	Y <sub>DLYT</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:1 Measure the delay between the input and the output of Y signal.	0	10	50	ns
Output Clamp Level 1 (COMB Mode)	Y <sub>CLPC</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:2 Measure the clamp level of output signal.	1.5	2	2.5	V
Output Clamp Level 2 (THR Mode)	Y <sub>CLPT</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:1 Measure the clamp level of output signal.	1.5	2	2.5	V
Y Signal S/N ratio 1 (COMB Mode)	Y <sub>SNC</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:2 Measure the S/N ratio of Y signal.			-50	dB
Y Signal S/N ratio 2 (THR Mode)	Y <sub>SNT</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:1 Measure the S/N ratio of Y signal.			-50	dB
Clock Leak (COMB Mode)	Y <sub>CLKC</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:2 Measure the clock leak.			-40	dB
Clock Leak (THR Mode)	Y <sub>CLKT</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:1 Measure the clock leak.			-60	dB
Y_Comb Depth 1	Y <sub>COMB1</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:2 Measure the comb depth at Fsc.		-35	-30	dB
Y_Comb Depth 2	Y <sub>COMB2</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:2 Measure the comb depth at (227.5-59)/227.5Fsc.		-15	-10	dB
Y_Comb Depth 3	Y <sub>COMB3</sub>	T14A T3A	T16	VIN = 1Vp-p, Video signal SW1:2 Measure the comb depth at (227.5+59)/227.5Fsc.		-15	-10	dB

Continued on next page.

# LA76604M

Continued from preceding page.

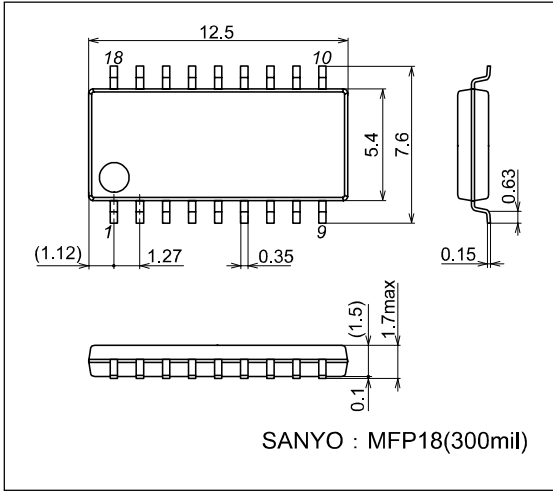
Parameter	Symbol	Input	Output	Conditions	Ratings			Unit
					min	typ	max	
Chroma Out Level (COMB Mode)	C <sub>LV</sub>	T14A T3A	T18	VIN = 0.7Vp-p, Video signal SW1:2 Measure the output level.	0.5	0.7	0.9	Vp-p
Chroma Out Level (THR Mode)	C <sub>LV</sub>	T1A	T18	VIN = 0.7Vp-p, Video signal SW1:1 Measure the output level.	0.5	0.7	0.9	Vp-p
Chroma f-Character 1 (COMB Mode)	C <sub>FC1</sub>	T14A T3A	T18	VIN = 1Vp-p, 1.5MHz, CW signal SW1:2 Measure the Gain between the input and the Output.	-6	-3	0	dB
Chroma f-Character 2 (COMB Mode)	C <sub>FC2</sub>	T14A T3A	T18	VIN = 1Vp-p, 4.5MHz, CW signal SW1:2 Measure the Gain between the input and the Output.	-6	-3	0	dB
Chroma f-Character 3 (THR Mode)	C <sub>FC3</sub>	T1A	T18	VIN = 1Vp-p, 10MHz, CW signal SW1:1 Measure the Gain between the input and the Output.	-3	0	3	dB
Chrominance Output DC Level 1 (COMB Mode)	C <sub>DCC</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:2 Measure the chrominance output DC level.	2	2.5	3	V
Chrominance Output DC Level 2 (THR Mode)	C <sub>DCT</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:1 Measure the chrominance output DC level.	2	2.5	3	V
C Signal S/N ratio 1 (COMB Mode)	C <sub>SNC</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:2 Measure the S/N ratio of C signal.			-50	dB
C Signal S/N ratio 2 (THR Mode)	C <sub>SNT</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:1 Measure the S/N ratio of C signal.			-50	dB
Clock Leak (COMB Mode)	C <sub>CLKC</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:2 Measure the clock leak.			-30	dB
Clock Leak (THR Mode)	C <sub>CLKT</sub>	T14A T3A	T18	VIN = 1Vpp, Video signal SW1:1 Measure the clock leak.			-60	dB
C Signal Delay (COMB mode)	C <sub>DLYC</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:2 Measure the delay between the input and the output of C signal.	200	400	600	ns
C Signal Delay (THR Mode)	C <sub>DLYT</sub>	T1A	T18	VIN = 1Vp-p, Video chroma SW1:1 Measure the delay between the input and the output of C signal.	0	10	50	ns
C_Comb Depth 1	C <sub>COMB1</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:2 Measure the comb depth at Fsc.		-35	-30	dB
C_Comb Depth 2	C <sub>COMB2</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:2 Measure the comb depth at (227.5-59)/227.5Fsc.		-15	-10	dB
C_Comb Depth 3	C <sub>COMB3</sub>	T14A T3A	T18	VIN = 1Vp-p, Video signal SW1:2 Measure the comb depth at (227.5+59)/227.5Fsc.		-15	-10	dB
Difference Of Delay Between Y and C	Y <sub>CDLY</sub>	T14A T3A	T16 T18	VIN = 1Vp-p, Video signal SW1:2 Measure the difference of delay between the Y output and C output.	-20	0	20	ns
INPUTSEL_L (YIN1)	IN <sub>SELL</sub>	T2	T2	YIN1 ON, measure the SW voltage.		0	1	V
INPUTSEL_H (YIN2)	IN <sub>SELH</sub>	T2	T2	YIN2 ON, measure the SW voltage.	2.5	5		V
OUTPUTSEL_H (COMB Mode)	OUT <sub>SELH</sub>	T17	T17	COMB Mode, measure the SW voltage.		0	1	V
OUTPUTSEL_L (THR Mode)	OUT <sub>SELL</sub>	T17	T17	COMB Mode, measure the SW voltage.	2.5	5		V
Cross talk between Different input 1	IN <sub>CRS</sub>	T14A	T16 T18	VIN = 1Vp-p, Video signal SW2:2 Measure the cross talk between different input.			-50	dB
Cross talk between Different input 2	IN <sub>CRS</sub>	T3A	T16 T18	VIN = 1Vp-p, Video signal SW2:1 Measure the cross talk between different input.			-50	dB

# LA76604M

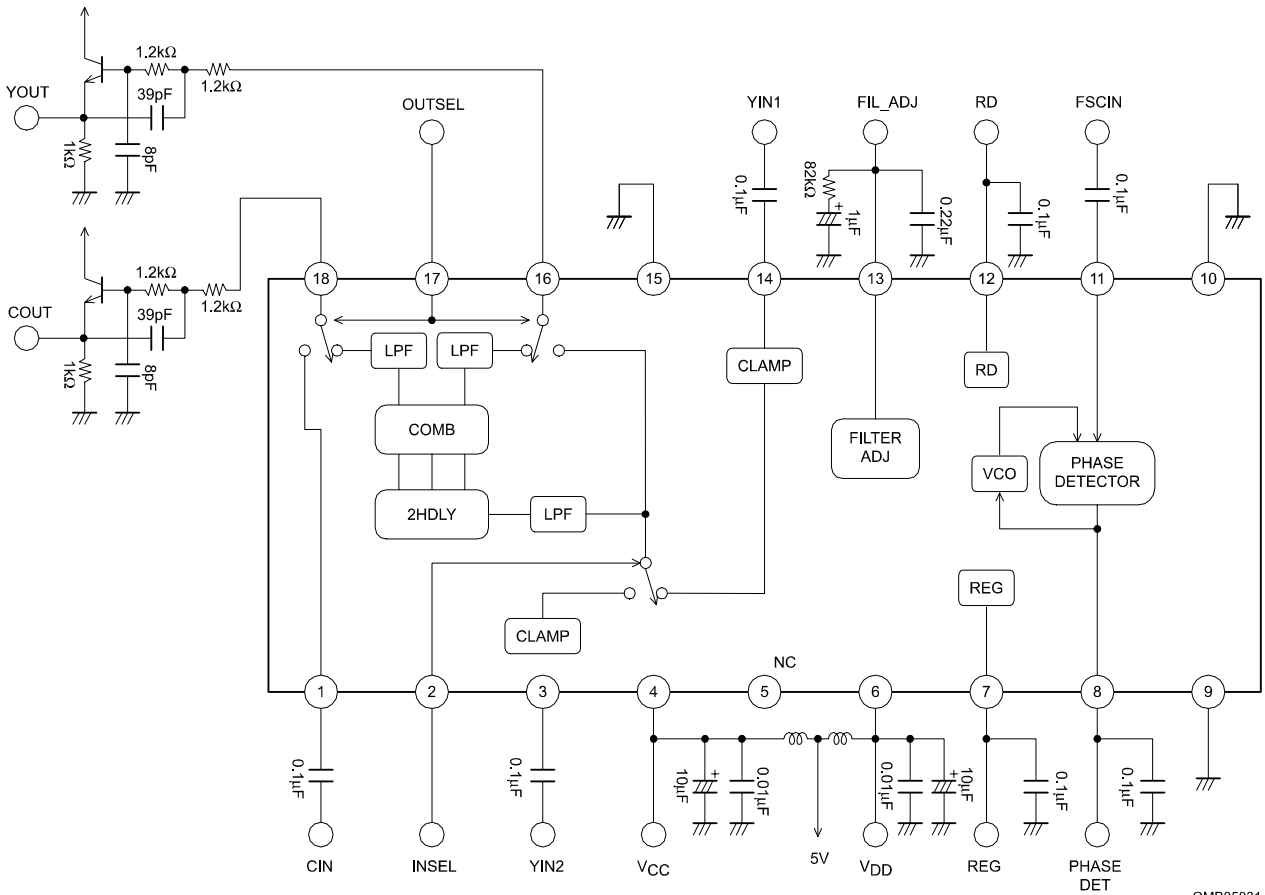
## Package Dimensions

unit: mm

3095A



## Block Diagram

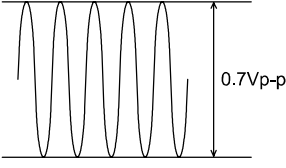
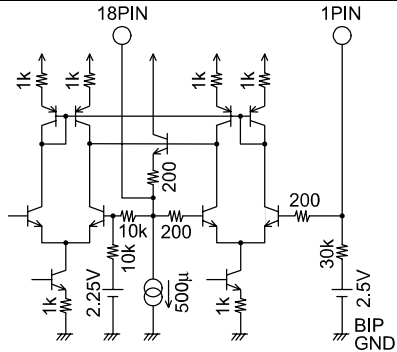
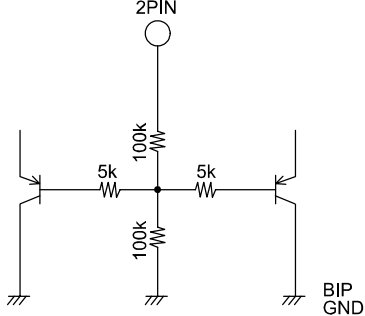
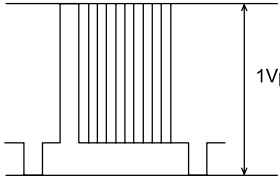
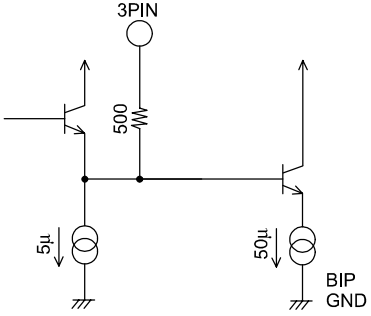
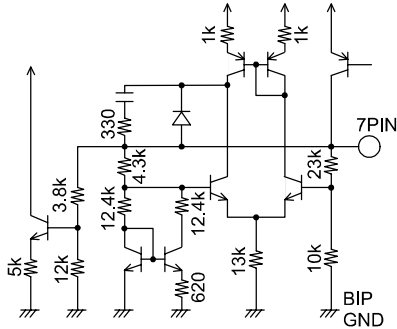


OMB05031

# LA76604M

## Pin Function

(unit: Ω)

Pin No.	Pin name	DC voltage	Signal waveform	Input/Output form
1	CIN	2.5V	<p style="text-align: center;">CHROMA-SIGNAL</p>  <p style="text-align: right;">0.7Vp-p</p>	
2	INSEL		<p>GND: YIN2 VCC: YIN1</p>	
3	YIN2	2.5V	<p style="text-align: center;">VIDEO-SIGNAL</p>  <p style="text-align: right;">1Vp-p</p>	
4	BIP-V <sub>CC</sub>	5V	DC	
6	CCD-V <sub>CC</sub>	5V	DC	
7	REG	4V	DC	

Continued on next page.

# LA76604M

Continued from preceding page.

(unit:  $\Omega$ )

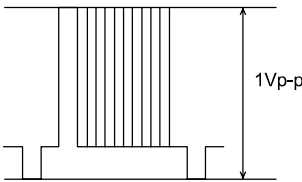
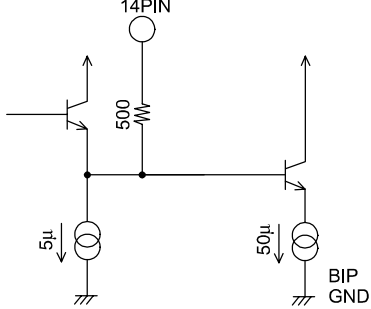
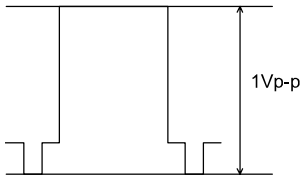
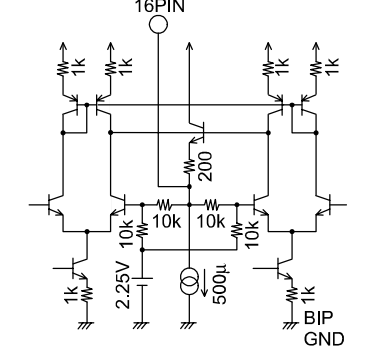
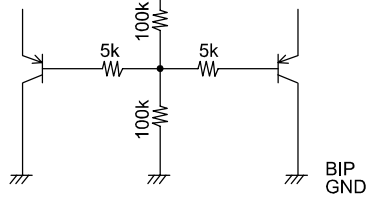
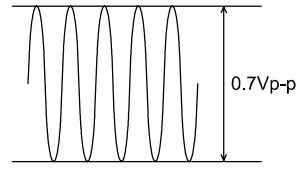
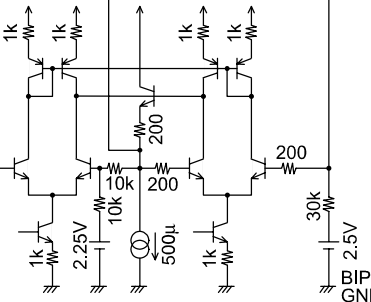
Pin No.	Pin name	DC voltage	Signal waveform	Input/Output form
8	PHASEDET	2.3V	DC	
9	CCD-GND	GND		
10	CCD-GND	GND		
11	FSC_IN	0.8V	<p style="text-align: center;">SIN-WAVE:3.58MHz</p>	
12	RD	10V	DC	
13	AFC	3.5V	DC	

Continued on next page.

# LA76604M

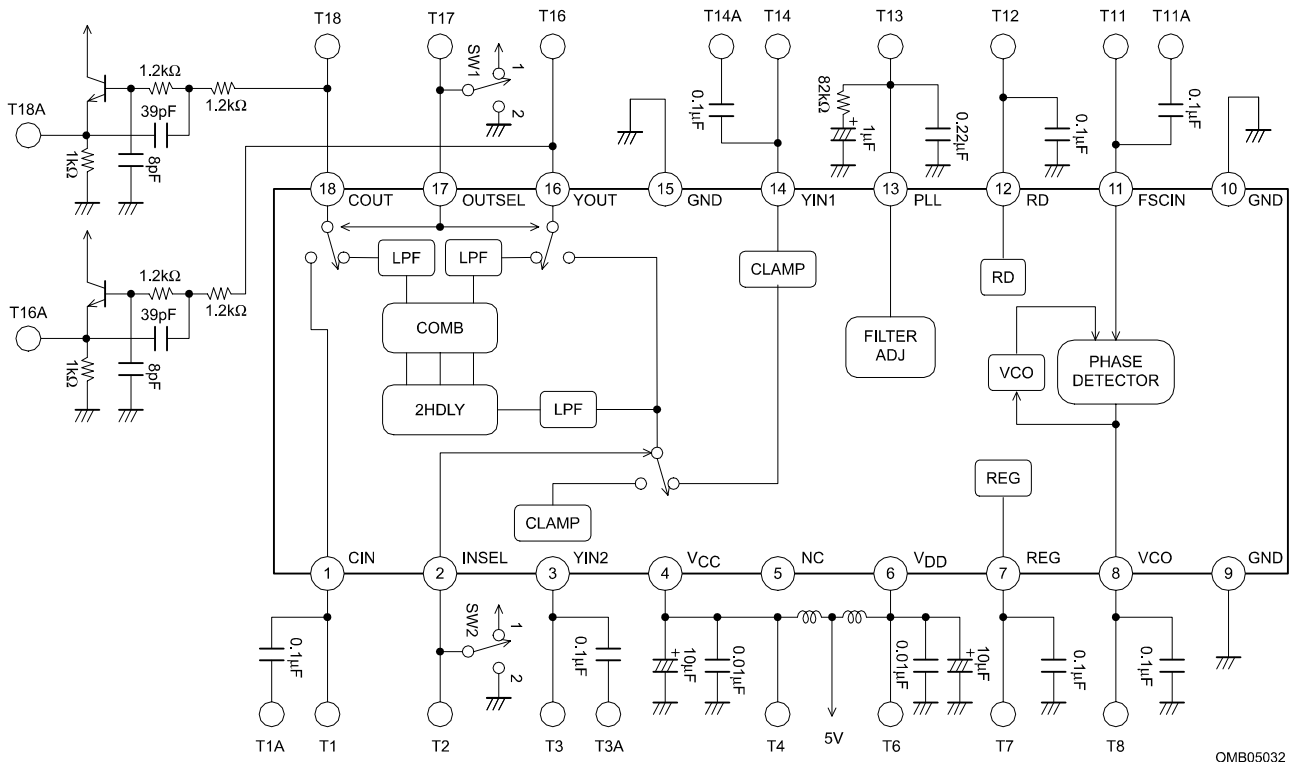
Continued from preceding page.

(unit:  $\Omega$ )

Pin No.	Pin name	DC voltage	Signal waveform	Input/Output form
14	YIN1		<p>VIDEO-SIGNAL</p>  <p style="text-align: right;">1Vp-p</p>	<p>14PIN</p>  <p style="text-align: right;">BIP GND</p>
15	BIP-GND	GND		
16	YOUT	2.5V	<p>Y-SIGNAL</p>  <p style="text-align: right;">1Vp-p</p>	<p>16PIN</p>  <p style="text-align: right;">BIP GND</p>
17	OUTSEL		<p>GND: COMB V<sub>CC</sub>: THROUGH</p>	<p>17PIN</p>  <p style="text-align: right;">BIP GND</p>
18	COUT	2.5V	<p>CHROMA-SIGNAL</p>  <p style="text-align: right;">0.7Vp-p</p>	<p>18PIN</p>  <p style="text-align: right;">BIP GND</p>

# LA76604M

## Test Circuit



■ Specifications of any and all SANYO Semiconductor products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

■ SANYO Semiconductor Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

■ In the event that any or all SANYO Semiconductor products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

■ No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Semiconductor Co., Ltd.

■ Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor product that you intend to use.

■ Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO Semiconductor 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.

This catalog provides information as of August, 2005. Specifications and information herein are subject to change without notice.