Ordering number:ENN3030A

Monolithic Digital IC

LB8901M

CCD Clock Driver

Overview

The LB8901M is a monolithic IC designed to drive large-capacity clock gates of a CCD image sensor (LC9900 series) at a high speed.

Features

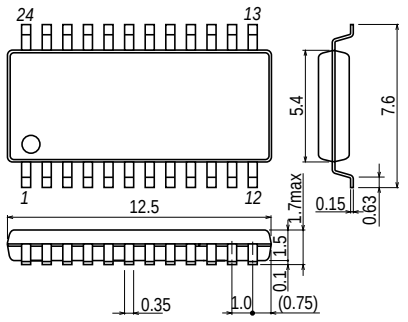
- Capable of driving large-capacity gates of a CCD, etc.
- On-chip eight-block driver, two of which are capable of providing drive on the three-value level (LC9900 series). No more than one chip is required to drive vertical gates.
- Placed in a 24-pin miniflat package (MFP24S), facilitating miniaturization of equipment.
- Capable of being driven direct with TTL, CMOS, etc.
- A power save circuit can be connected to permit less power dissipation.

Package Dimensions

unit:mm

3112A-MFP24S

[LB8901M]



SANYO : MFP24S

Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	Each V_{CC} pin	–0.3 to +18.0	V
Input supply voltage	V_{IN}	Each input pin	–0.3 to +6.0	V
Maximum output current	I_{OUT}	Each output pin	250	mA
Allowable power dissipation	Pd max		620	mW
Operating temperature	Topr		–10 to +70	˚C
Storage temperature	Tstg		–40 to +125	˚C

Allowable Operating Ranges at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}	Each V_{CC} pin	5 to 18	V
	ΔV_{CC}1-2	$\lvert V_{CC}1 - V_{CC}2 \rvert$ voltage difference	0 to 6.0	V
Input high-level voltage	V_{IH}	Each input pin	2.5 to 6.0	V
Input low-level voltage	V_{IL}	Each input pin	–0.3 to +0.3	V

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Electrical Characteristics at Ta = 25˚C, $V_{CC}1$=9.0V, $V_{CC}2$ to 5=13.0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input high-level current	$I_{IH}1$	V_I1, V_I3 inputs of blocks 1, 2, V_{IN}=5.0V		1.0	2	mA
	$I_{IH}2$	V_{IF}, V_{IS} inputs of blocks 1, 2, V_{IN}=5.0V		1.0	2	mA
	$I_{IH}3$	V_I2, V_I4 inputs of blocks 3, 4, V_{IN}=5.0V		1.0	2	mA
	$I_{IH}4$	V_S1 to 4 inputs of blocks 5 to 8, V_{IN}=5.0V		1.0	2	mA
Input low-level current	$I_{IL}1$	V_I1 to 4, V_S1 to 4 inputs of blocks 1 to 8, V_{IN}=0V	–30			µA
	$I_{IL}2$	V_{IF}, V_{IS} inputs of blocks 1, 2, V_{IN}=0V	–100	–20		µA
Supply current	$I_{CCH}1$	Each input ; V_{IN}=5.0V		0.5	1	mA
	$I_{CCH}2$	Each input ; V_{IN}=5.0V		4.0	8	mA
	$I_{CCH}3$	Each input ; V_{IN}=5.0V		4.0	8	mA
	$I_{CCH}4$	Each input ; V_{IN}=5.0V		4.0	8	mA
	$I_{CCH}5$	Each input ; V_{IN}=5.0V		4.0	8	mA
	$I_{CCL}1$	Each input ; V_{IN}=0V			300	µA
	$I_{CCL}2$	Each input ; V_{IN}=0V			100	µA
	$I_{CCL}3$	Each input ; V_{IN}=0V			100	µA
	$I_{CCL}4$	Each input ; V_{IN}=0V			100	µA
	$I_{CCL}5$	Each input ; V_{IN}=0V			100	µA
Output voltage	$V_{OH}1$	V_I1=0V, V_{IF}=5V	$V_{CC}2$–2.0			V
	$V_{OH}2$	V_I1=0V, V_{IF}=0V	$V_{CC}1$–1.0			V
	$V_{OH}3$	V_I3=0V, V_{IS}=5V	$V_{CC}2$–2.0			V
	$V_{OH}4$	V_I3=5V, V_{IS}=0V	$V_{CC}1$–1.0			V
	$V_{OH}5$	V_I2, V_I4=0V	$V_{CC}3$–2.0			V
	$V_{OH}6$	V_S3, V_S4=0V	$V_{CC}4$–2.0			V
	$V_{OH}7$	V_S1, V_S2=0V	$V_{CC}5$–2.0			V
	V_{OL}	Each input V_{IN}=5V			1.0	V

Switching Characteristics at Ta = 25˚C, $V_{CC}1$=9.0V, $V_{CC}2$ to 5=13.0V, V_{IN}=5.0V, t_r, t_f≤10ns

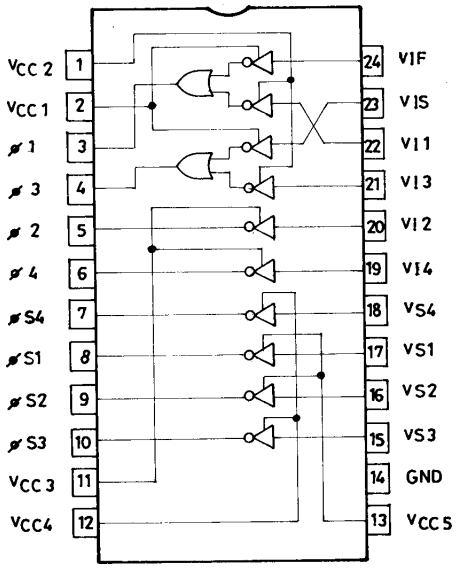
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Propagation time low-level →high-level	$t_{PLH}1$	ø1, 3 outputs ; V_{IF}, V_{IS}=5.0V fixed		30		ns
	$t_{PLH}2$	ø1, 3 outputs ; V_I1, V_I3=5.0V fixed		2		µs
	$t_{PLH}3$	ø2, 4, øS1 to 4 outputs		30		ns
Propagation time high-level →low-level	$t_{PHL}1$	ø1, 3 outputs ; V_{IF}, V_{IS}=5.0V fixed		30		ns
	$t_{PHL}2$	ø1, 3 outputs ; V_I1, V_I3=5.0V fixed		1		µs
	$t_{PHL}3$	ø2, 4, øS1 to 4 outputs		30		ns
Transient rise time	t_r1	ø1, 3 outputs ; V_{IF}, V_{IS}=5.0V fixed		30		ns
	t_r2	ø1, 3 outputs ; V_I1, V_I3=5.0V fixed		6		µs
	t_r3	ø2, 4, øS1 to 4 outputs		30		ns
Transient fall time	t_f1	ø1, 3 outputs ; V_{IF}, V_{IS}=5.0V fixed		30		ns
	t_f2	ø1, 3 outputs ; V_I1, V_I3=5.0V fixed		300		ns
	t_f3	ø2, 4, øS1 to 4 outputs		30		ns

Note : Load conditions

· Positive three-value driver (ø1, 3) ..... RS=16Ω, C_L=1200pF

· Positive two-value driver (ø2, 4, øS1 to 4) ..... RS=20Ω, C_L=1300pF

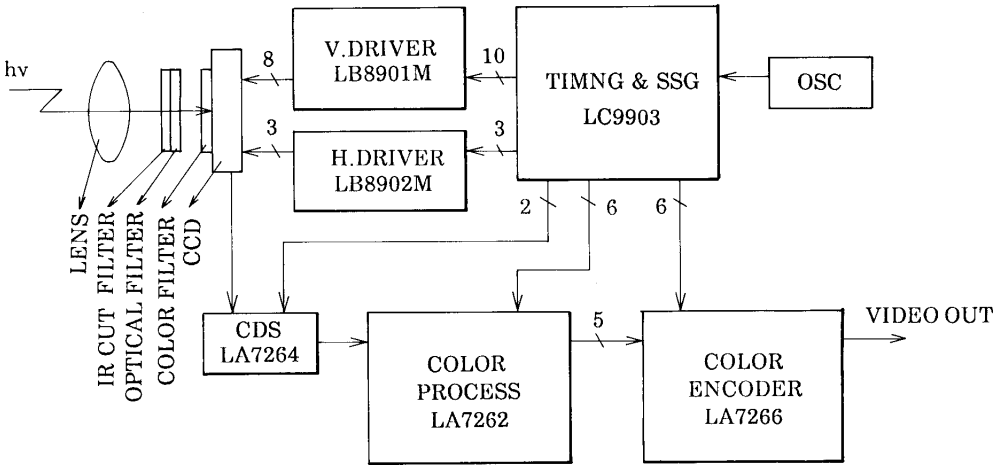
Equivalent Circuit Block Diagram



Pin Function

Pin No.	Pin Name	Pin Description
1	$V_{CC}2$	Power supply for frame shift pulse at ø1, 3
2	$V_{CC}1$	Power supply for three-value pulse at ø1, 3
3	ø1	Positive three-value drive output, for ø1 of CCD
4	ø2	Positive three-value drive output, for ø3 of CCD
5	ø3	Positive two-value drive output, for ø2 of CCD
6	ø4	Positive two-value drive output, for ø4 of CCD
7	øS4	Positive two-value drive output, for øS4 of CCD
8	øS1	Positive two-value drive output, for øS1 of CCD
9	øS2	Positive two-value drive output, for øS2 of CCD
10	øS3	Positive two-value drive output, for øS3 of CCD
11	$V_{CC}3$	Power supply for ø2, 4
12	$V_{CC}4$	Power supply for øS3, S4
13	$V_{CC}5$	Power supply for øS1, S2
14	GND	Ground pin
15	V_S3	Clock input for øS3 driver
16	V_S2	Clock input for øS2 driver
17	V_S1	Clock input for øS1 driver
18	V_S4	Clock input for øS4 driver
19	V_I4	Clock input for ø4 driver
20	V_I2	Clock input for ø2 driver
21	V_I3	Clock input for ø3 driver
22	V_I1	Clock input for ø1 driver
23	V_{IS}	Three-value pulse input for ø3 driver
24	V_{IF}	Three-value pulse input for ø1 driver

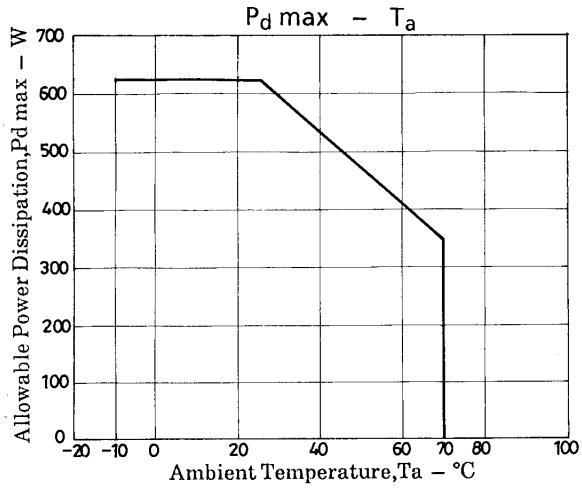
Sample Application Circuit : Camera Block Diagram



Proper Cares to be Taken in Designing a Printed Circuit Board

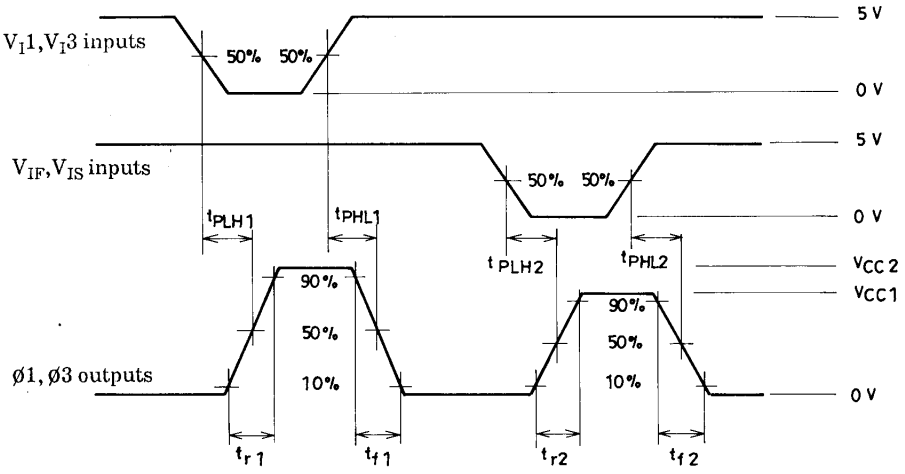
The LB8901M draws a large instantaneous current when it drives a load. The LB8901M is also designed to drive a load at a very high speed. When designing a printed circuit board, keep in mind the following points to prevent the output waveforms from being adversely affected.

1) Make the pattern of the power supply, GND lines as large as possible.
2) Place the bypass capacitor as close to the IC as possible (less than 1cm).
3) Make the wiring of the input signal line as short as possible to minimize the effect of stray capacitance.
4) Make the wiring of the output signal line also as short as possible, because the inductance of a long signal line may affect the output waveforms adversely.
   Take such necessary measures that a small resistance is inserted in series with a load.
5) When using a power save circuit, place it also as close to the IC as possible.



Switching Waveforms

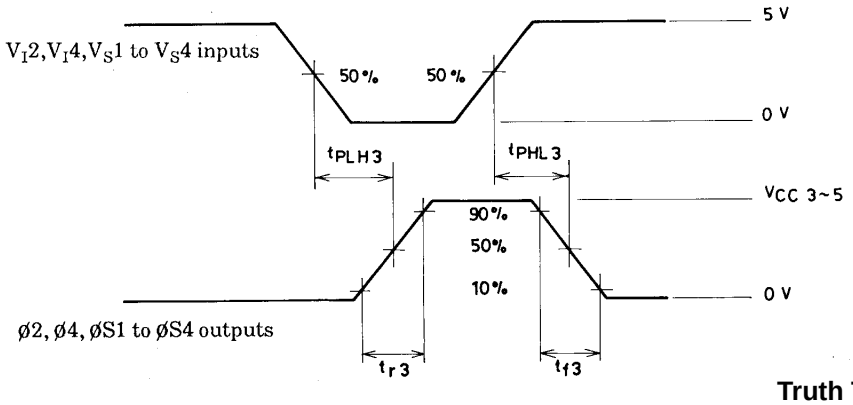
1) Blocks 1, 2



Truth Table

		V_{IF}, V_{IS} inputs	
		HIGH	LOW
V_I1, V_I3 Input	HIGH	V_{OL}	V_{OH}2, 4
	LOW	V_{OH}1, 3	Inhibit

2) Blocks 3 to 8



Truth Table

		Output
Input	HIGH	V_{OL}
	LOW	V_{OH}5 to 7