Ordering number: EN 3046B

Monolithic Digital IC

NO.3046B

LB8904M

CCD Clock Driver

Overview

· The LB8904M is a monolithic IC designed to drive clock gates of a CCD image sensor (LC9943,etc.) at high speed.

Features

· Capable of driving capacitive gates of a CCD, etc.
· On-chip eight-block vertical driver, one of which is capable of providing drive on the three-value level, and on-chip two-block horizontal driver. No more than one chip is required to drive clock gates of the LC9943, etc.
· Placed in a 30-pin miniflat package, facilitating miniaturization of equipment.
· Capable of being driven direct with CMOS, etc.

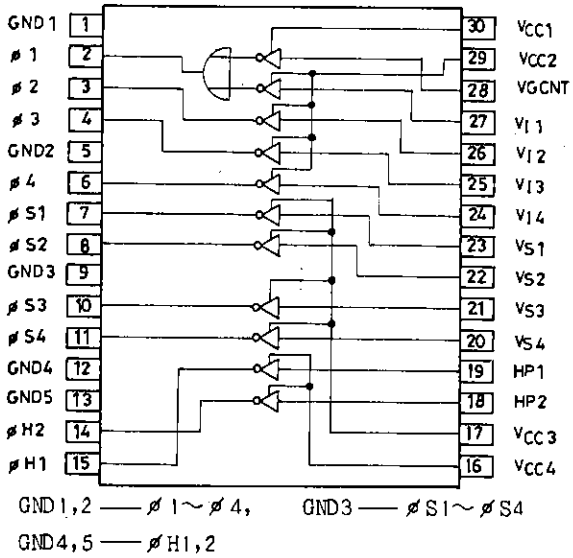
Absolute Maximum Ratings at Ta = 25°C

				unit
Maximum Supply Voltage	V_{CC} max	V_{CC}1 to 4	−0.3 to +16.0	V
Input Supply Voltage	V_{IN}	Each input pin	−0.3 to +6.0	V
Maximum Output Current	I_{OUT}	Each output pin	150	mA
Allowable Power Dissipation	Pd max		665	mW
Operating Temperature	Topr		−10 to +70	°C
Storage Temperature	Tstg		−40 to +125	°C

Allowable Operating Conditions at Ta = 25°C

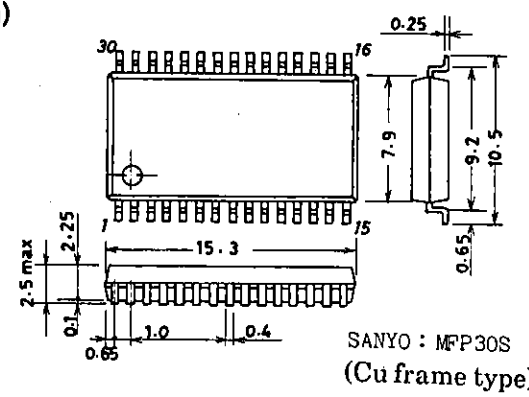
				unit
Supply Voltage	V_{CC}	Each V_{CC} pin	5 to 16	V
	$V_{CC}1 - V_{CC}2$	Voltage difference ($V_{CC}1 \leqq V_{CC}2$ to 4)	0 to 6.0	V
Input 'H'-Level Voltage	V_{IH}	Each input pin	3.5 to 6.0	V
Input 'L'-Level Voltage	V_{IL}	Each input pin	−0.3 to +0.3	V

Equivalent Circuit Block Diagram



Package Dimensions 3073A-M30IC

(unit : mm)



SANYO : MFP30S
(Cu frame type)

Electrical Characteristics at Ta = 25°C, $V_{CC}1$ to 3 = 14V, $V_{CC}4$ = 11V

			min	typ	max	unit
Input 'H'-Level Current	$I_{IH}1$	Block1, V_I1 input, V_{IN} = 5.0V			2	mA
	$I_{IH}2$	Block1, V_{GCNT} input, V_{IN} = 5.0V			2	mA
	$I_{IH}3$	Blocks2 to 8, V_I2 to 4 inputs, V_{IN} = 5.0V V_S1 to 4 inputs, V_{IN} = 5.0V			2	mA
	$I_{IH}4$	Blocks9,10, HP1,2 inputs, V_{IN} = 5.0V			2	mA
Input 'L'-Level Current	$I_{IL}1$	Blocks1 to 10, V_I1 to 4 inputs V_S1 to 4 inputs V_{IN} = 0V	−30			μA
	$I_{IL}2$	Block1, V_{GCNT} input, V_{IN} = 0V	−100	−20		μA
Supply Current	$I_{CCH}1$	Each input, V_{IN} = 5.0V			0.5	mA
	$I_{CCH}2$	Each input, V_{IN} = 5.0V			16	mA
	$I_{CCH}3$	Each input, V_{IN} = 5.0V			16	mA
	$I_{CCH}4$	Each input, V_{IN} = 5.0V			8	mA
	$I_{CCL}1$	V_I1 = 0V, V_{GCNT} = 0V			150	μA
	$I_{CCL}2$	V_I2 to 4 inputs, V_{IN} = 0V,			200	μA
	$I_{CCL}3$	V_S1 to 4 inputs, V_{IN} = 0V			200	μA
	$I_{CCL}4$	HP1,2 inputs, V_{IN} = 0V			100	μA
Output Voltage	$V_{OH}1$	V_I1 = 0V, V_{GCNT} = 5V		$V_{CC}2$ − 2.0		V
	$V_{OH}2$	V_I1 = 5V, V_{GCNT} = 0V		$V_{CC}1$ − 2.0		V
	$V_{OH}3$	V_I2 to 4 = 0V		$V_{CC}2$ − 2.0		V
	$V_{OH}4$	V_S1 to 4 = 0V		$V_{CC}3$ − 2.0		V
	$V_{OH}5$	HP1,2 = 0V		$V_{CC}4$ − 2.0		V
	V_{OL}	Each input, V_{IN} = 5V			0.5	V

Switching Characteristics at Ta = 25°C, $V_{CC}1$ to 3 = 14V, $V_{CC}4$ = 11V, V_{IN} = 5.0V, $t_r, t_f \leqq$ 10ns

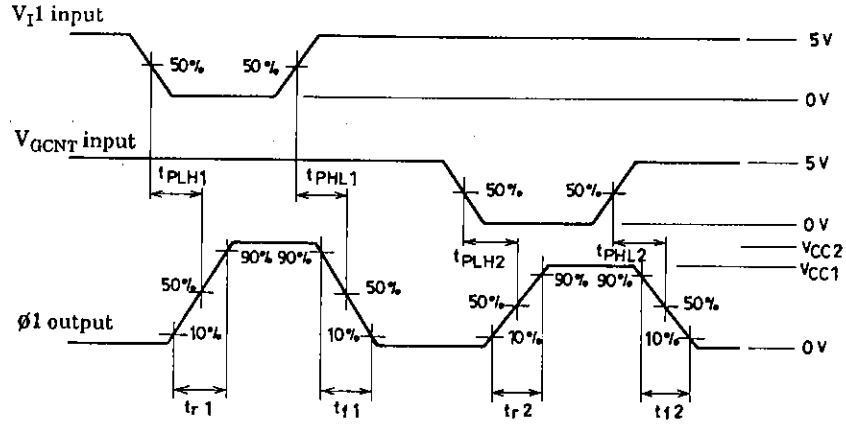
			min	typ	max	unit
Propagation Time 'L'-Level → 'H'-Level	$t_{PLH}1$	ø1 output, V_{GCNT} = 5.0V fixed		30		ns
	$t_{PLH}2$	ø1 output, V_I1 = 5.0V fixed		2		μs
	$t_{PLH}3$	ø2 to 4, $ø_S1$ to 4, øH1,2 outputs		30		ns
Propagation Time 'H'-Level → 'L'-Level	$t_{PHL}1$	ø1 output, V_{GCNT} = 5.0V fixed		30		ns
	$t_{PHL}2$	ø1 output, V_I1 = 5.0V fixed		1		μs
	$t_{PHL}3$	ø2 to 4, $ø_S1$ to 4 outputs, øH1,2 outputs		30		ns
Transient Rise Time	t_r1	ø1 output, V_{GCNT} = 5.0V fixed		30		ns
	t_r2	ø1 output, V_I1 = 5.0V fixed		6		μs
	t_r3	ø2 to 4, $ø_S1$ to 4 outputs, øH1,2 outputs		30		ns
Transient Fall Time	t_f1	ø1 output, V_{GCNT} = 5.0V fixed		30		ns
	t_f2	ø1 output, V_I1 = 5.0V fixed		1		μs
	t_f3	ø2 to 4, $ø_S1$ to 4, øH1,2 outputs		30		ns

Note : Load conditions

- Vertical three-value driver (ø1) ..... R_S = 62Ω, C_L = 140pF
- Vertical two-value driver (ø2 to 3, $ø_S1$ to 4) ..... R_S = 62Ω, C_L = 140pF
- Horizontal two-value driver (ø H1,2) ..... R_S = 430Ω, C_L = 45pF

Switching Waveforms

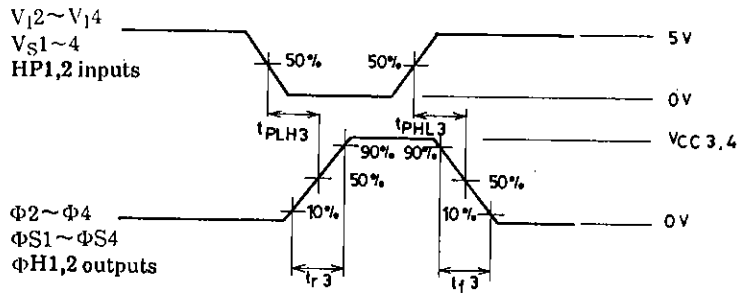
1. Block 1



Truth Table

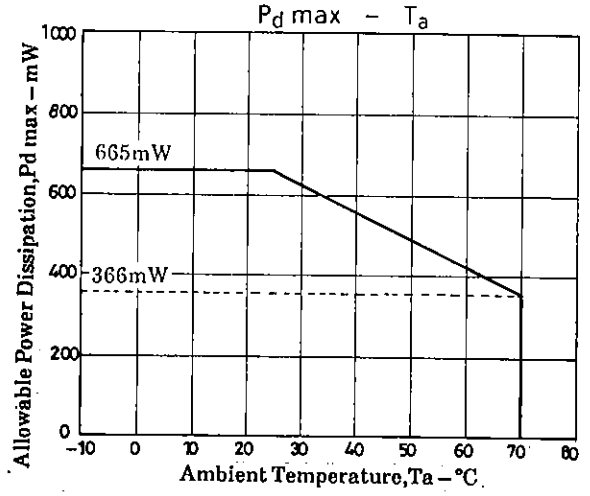
Item		V_{GCNT} inputs	
		H	L
V_I1 input	H	V_{OL}	$V_{OH}2$
	L	$V_{OH}1$	Inhibit

2. Blocks 2 to 10



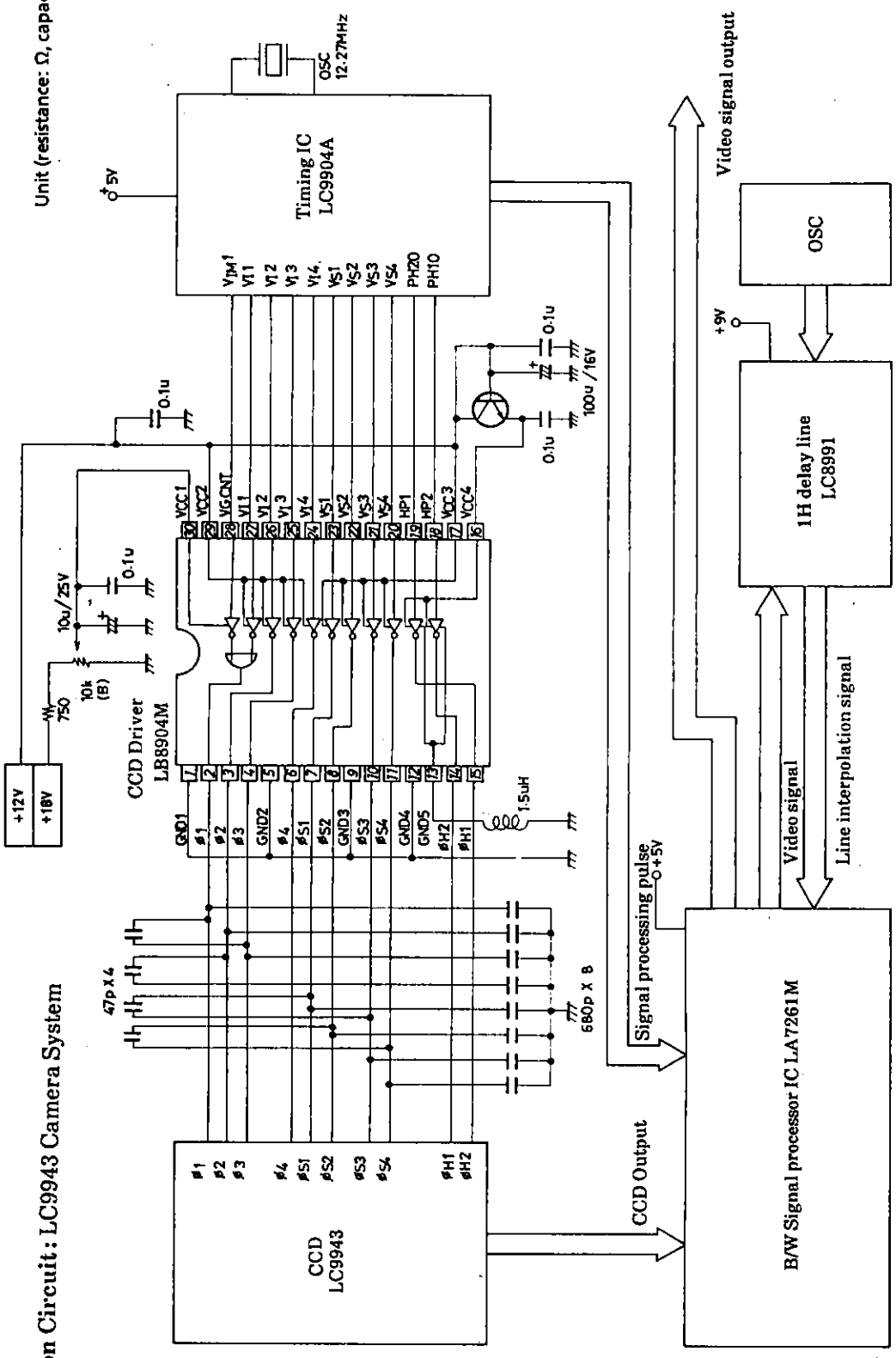
Truth Table

Item		Output
Input	H	V_{OL}
	L	$V_{OH}3$ to 7



Sample Application Circuit : LC9943 Camera System

Unit (resistance: Ω, capacitance: F)



Proper Cares to be Taken in Designing a Printed Circuit Board

When operating the LB8904M at high speed, design the printed circuit board with the following points kept in mind.

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.

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