SONY

CXD1156Q/R

Timing Generator IC for ICX026/027

Description

CXD1156Q/R is a timing generator IC for CCD imagers ICX026AK/AL and ICX027AK/AL.

Features

- NTSC/CCIR
- Field accumulation mode
- Color/Black and White mode
- 1/60 to 1/10,000 sec. variable speed, built-in electronic shutter.
- Built-in horizontal driver.
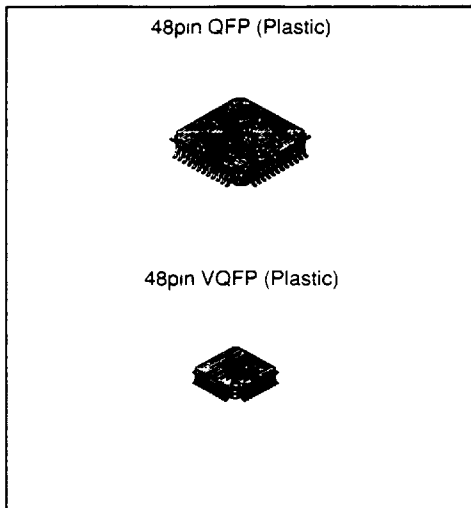- Initialize operation at every field.

Functions

Timing generation for CCD imagers.
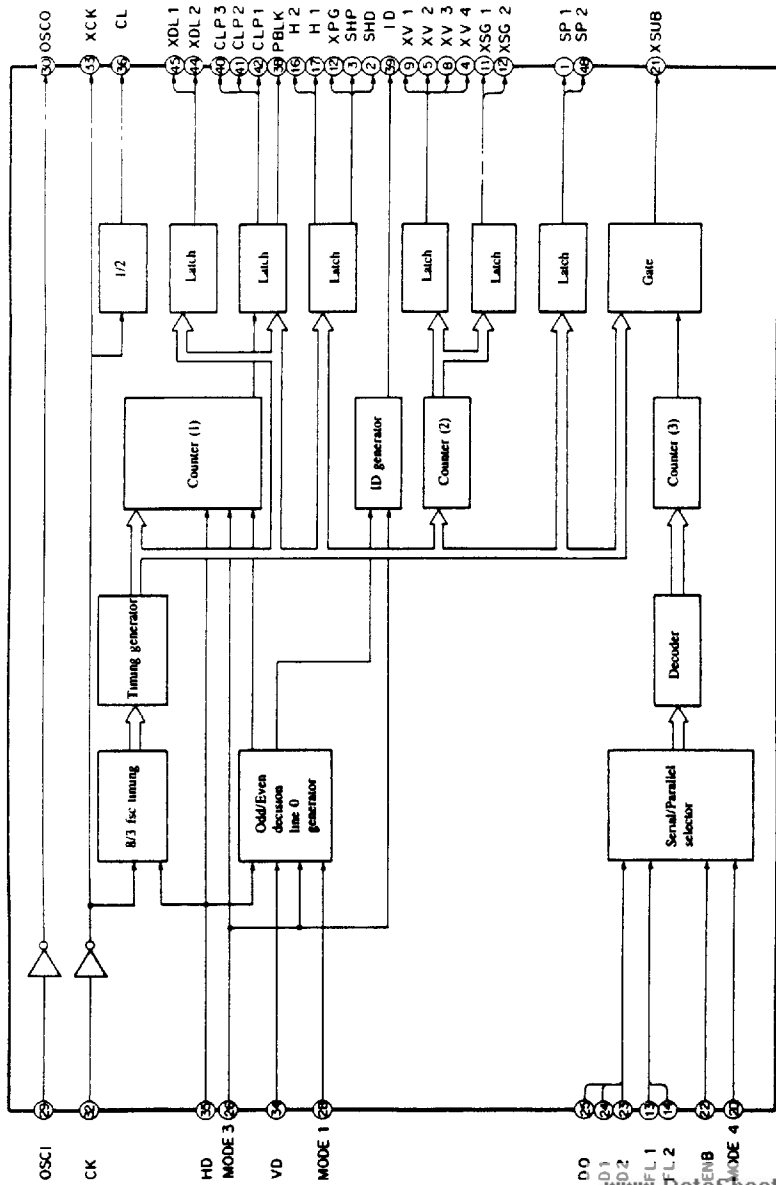
Structure

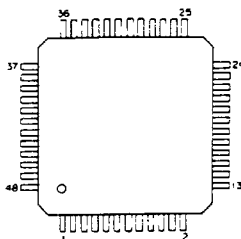Silicon gate CMOS

Application

CCD camera system

48pin QFP (Plastic)

48pin VQFP (Plastic)

Absolute Maximum Ratings (Ta = 25°C, Vss = 0V)

• Supply voltage	VDD	Vss − 0.5 to +7.0	V
• Input voltage	VI	Vss − 0.5 to VDD + 0.5	V
• Output voltage	VO	Vss − 0.5 to VDD + 0.5	V
• Operating temperature	Topr	− 20 to +75	°C
• Storage temperature	Tstg	− 55 to +150	°C

Block Diagram

Pin Configuration (Top View)

Pin Description

No.	Symbol	I/O	Description
1	SP1	O	Color separation pulse ('L' in B/W mode)
2	SHD	O	Data sample hold pulse
3	SHP	O	Precharge level sample hold pulse
4	XV4	O	Vertical scanning clock
5	XV2	O	Vertical scanning clock
6	Vss	–	GND
7	TEST1	I	GND
8	XV3	O	Vertical scanning clock
9	XV1	O	Vertical scanning clock
10	XSG2	O	Sensor charge read out pulse
11	XSG1	O	Sensor charge read out pulse
12	XPG	O	Precharge gate pulse
13	FL1	I	Mode select L: Flicker less H: Normal, (pull up)
14	FL2	I	Mode select L: 60Hz H: 50Hz, (pull up)
15	Vss2	–	GND for driver
16	H2	O	Horizontal scanning clock
17	H1	O	Horizontal scanning clock
18	VDD2	–	+ 5V supply pin for driver
19	VDD	–	+ 5V
20	MODE4	I	Mode select L: Serial input H: Parallel input, (pull up)
21	XSUB	O	Discharge pulse
22	ENB	I	Enable signal L: Normal H: Electronic shutter (pull up)
23	D2	I	Shutter speed setting (schmitt input), (pull up)
24	D1	I	Shutter speed setting (schmitt input), (pull up)
25	D0	I	Shutter speed setting (schmitt input), (pull up)
26	MODE3	I	Mode select L: NTSC H: PAL., (pull down)
27	TEST2	I	GND
28	MODE1	I	Mode select L: Color H:B/W, (pull down)
29	OSCI	I	Ocsillation input oscillation frequency. NTSC: 28.6364 MHz CCIR: 28.3750 MHz
30	OSCO	O	Oscillation output
31	Vss	–	GND
32	CK	I	Duty control inverter input
33	XCK	O	Duty control inverter output

No	Symbol	I/O	Description
34	VD	I	Vertical drive pulse
35	HD	I	Horizontal drive pulse
36	CL	O	4 fsc clock output (Sync generator clock input)
37	TEST0	I	GND
38	PBLK	O	Blanking cleaning pulse
39	ID	O	Line discrimination pulse
40	CLP3	O	Clamp pulse
41	CLP2	O	Clamp pulse
42	CLP1	O	Clamp pulse
43	VDD	–	+5V
44	XDL2	O	Delay line pulse ('L' in B/W mode)
45	XDL1	O	Delay line pulse ('L' in B/W mode)
46	TEST3	I	GND
47	TEST4	I	GND
48	SP2	O	Color separation pulse ('L' in B/W mode)

Recommended Operating Conditions

Electrical characteristics (DC characteristics)

Item		Symbol	Min.	Typ.	Max.	Unit
Supply voltage		V_{DD}	4.75	5.0	5.25	V
I/O voltage		V_I, V_O	V_{SS}		V_{DD}	V
Input voltage (Logical value) CMOS input cell		V_{IH}	$0.7V_{DD}$			V
		V_{IL}			$0.3V_{DD}$	
Schmitt trigger input voltage (D0, D1, D2)		V_{T+}	$0.8V_{DD}$			V
		V_{T-}			$0.2V_{DD}$	
		$V_{T+}-V_{T-}$	0.7	0.9		
Input rising, falling time		t_r, t_f	0		500	ns
Operating temperature		T_a	–20		+75	°C
Output voltage 1	I_{OH} = –2mA	V_{OH1}	[3]			V
	I_{OL} = 4mA	V_{OL1}			0.4	V
[1] Output voltage 2	I_{OH} = –4mA	V_{OH2}	[3]			V
	I_{OL} = 8mA	V_{OL2}			0.4	V
[2] Output voltage 3	I_{OH} = –8mA	V_{OH3}	[3]			V
	I_{OL} = 8mA	V_{OL3}			0.4	V

[1]. Pin 12 (XPG).
[2]. Pins 16 and 17 (H1,H2)
[3]. V_{DD} – 0.5

Oscillation I/O Electrical Characteristics (OSCI, OSCO, CK, XCK)

Item		Symbol	Min.	Typ.	Max.	Unit
Logical threshold value		V_{th}		$V_{DD}/2$		V
Input voltage		V_{IH}	$0.7V_{DD}$			V
		V_{IL}			$0.3V_{DD}$	V
Feedback resistor	$V_{IN} = V_{SS}$ or V_{DD}	R_{FB}	500k	2M	5M	Ω
Output voltage	$I_{OH} = -1mA$	V_{OH}	$V_{DD}/2$			V
	$I_{OL} = 1mA$	V_{OL}			$V_{DD}/2$	V

AC Characteristics

Serial input mode
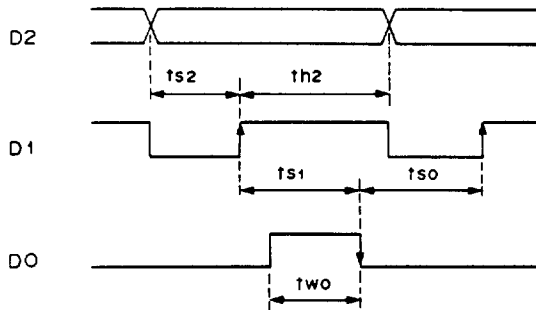
| Symbol	Item	MIN.	MAX.
ts2	D2 set up time vs. D1 rising edge	20nS	—
th2	D2 hold time vs. D1 rising edge	20nS	—
ts1	D1 rising edge set up time vs. D0 falling edge	20nS	—
tw0	D0 pulse width	20nS	50µS
ts0	D0 falling edge set up time vs. D1 rising edge	20nS	—

Mode Setting

1. Parallel input (mode 4 = 'H')

Table-1

| ENB	MODE 3	MODE 4	FL1	FL2	D2	D1	D0	Shutter speed
H	L	H	H		L	L	L	1/60
H	L	H	H		L	L	H	1/125
H	L	H	H		L	H	L	1/250
H	L	H	H		L	H	H	1/500
H	L	H	H		H	L	L	1/1000
H	L	H	H		H	L	H	1/2000
H	L	H	H		H	H	L	1/4000
H	L	H	H		H	H	H	1/10000
H	H	H	H		L	L	L	1/60
H	H	H	H		L	L	H	1/125
H	H	H	H		L	H	L	1/250
H	H	H	H		L	H	H	1/500
H	H	H	H		H	L	L	1/1000
H	H	H	H		H	L	H	1/2000
H	H	H	H		H	H	L	1/4000
H	H	H	H		H	H	H	1/10000
H	L		L	H				1/100
H	L		L	L				1/120
H	H		L	H				1/100
H	H		L	L				1/120
L								NORMAL

2. Serial input mode (mode 4 = 'L')
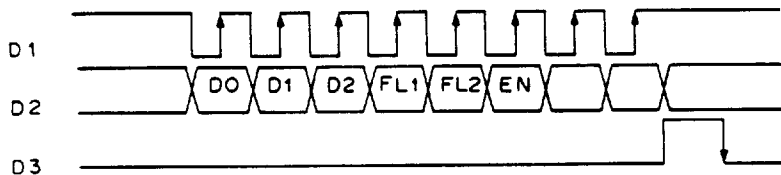
D2 data is latched by the register with the rising edge of D1, and taken inside with the falling edge of D0.
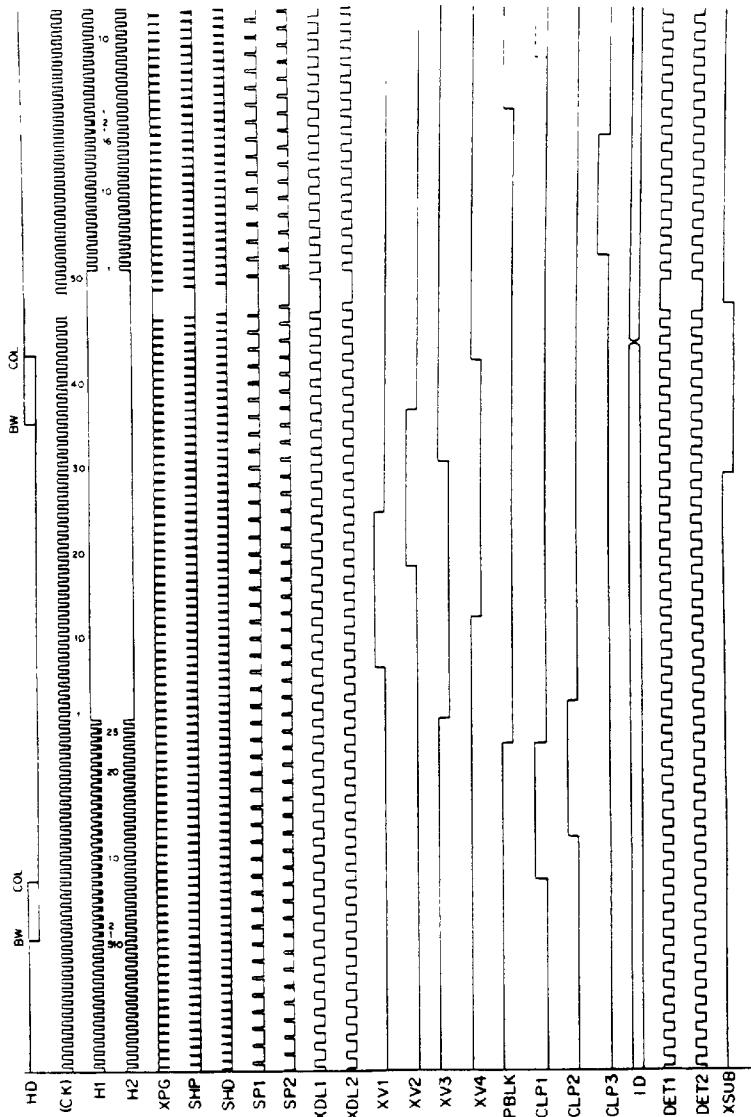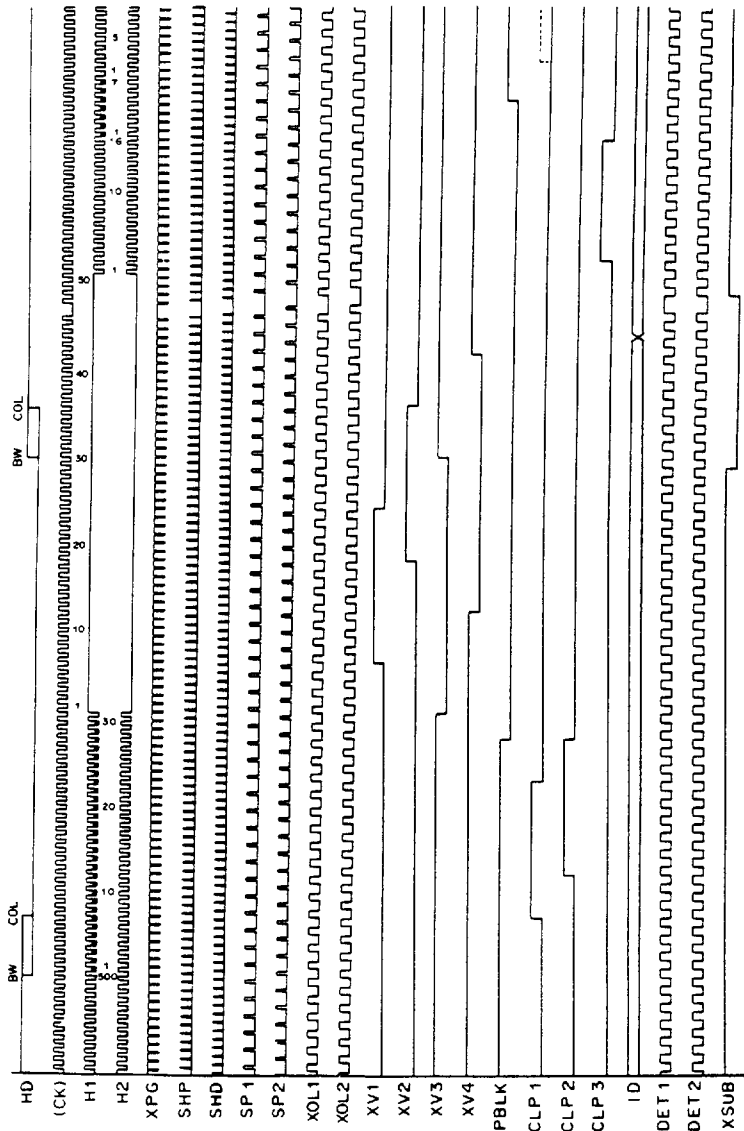
Application Circuit (NTSC mode, color mode)
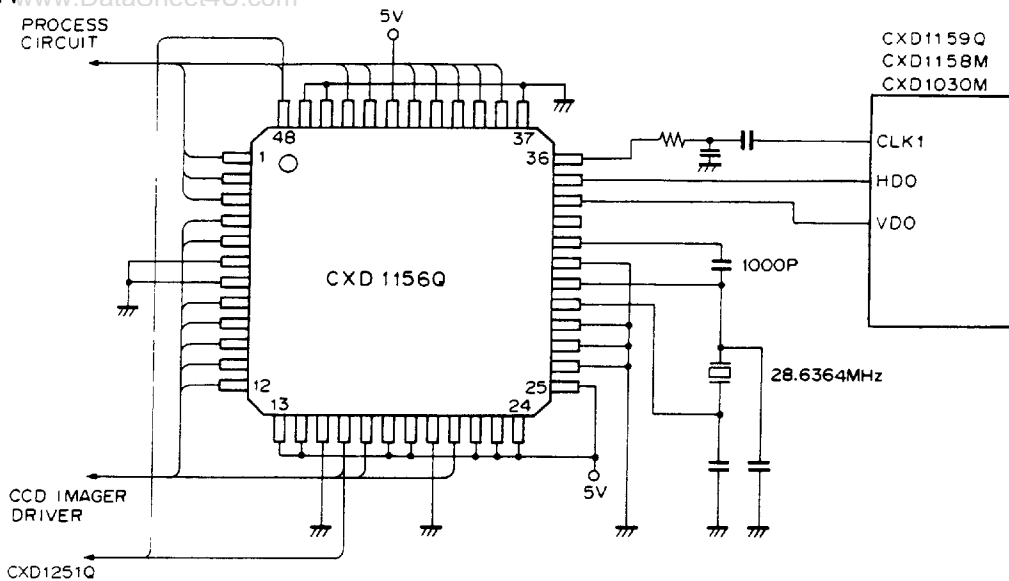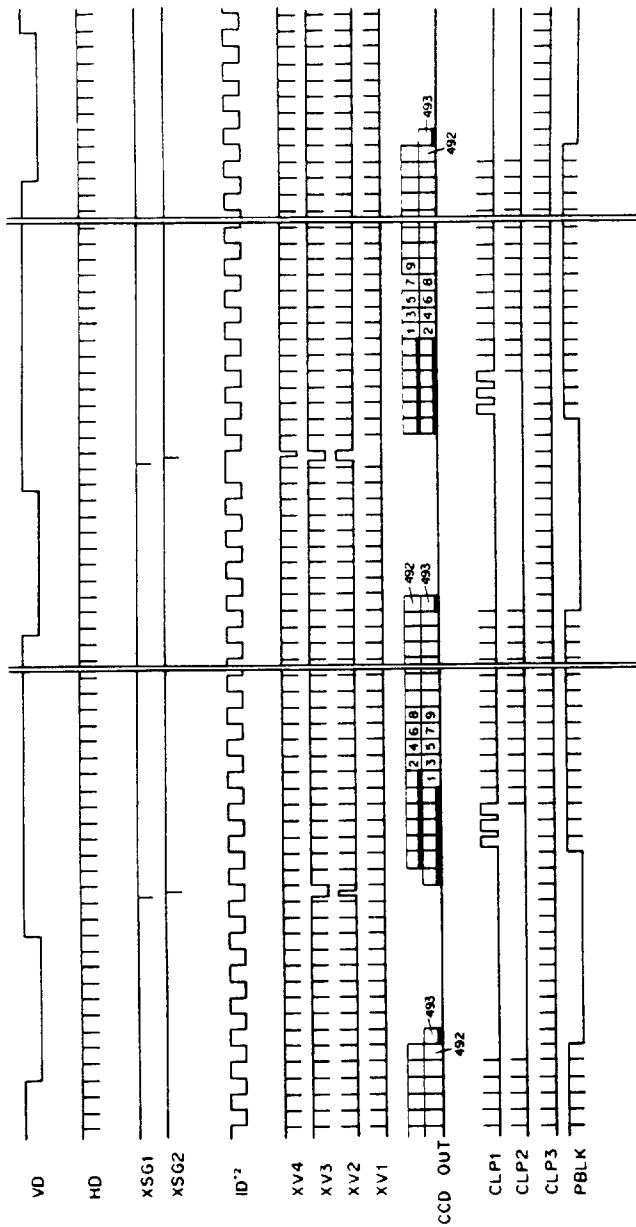

Timing Chart 1. [High speed timing]
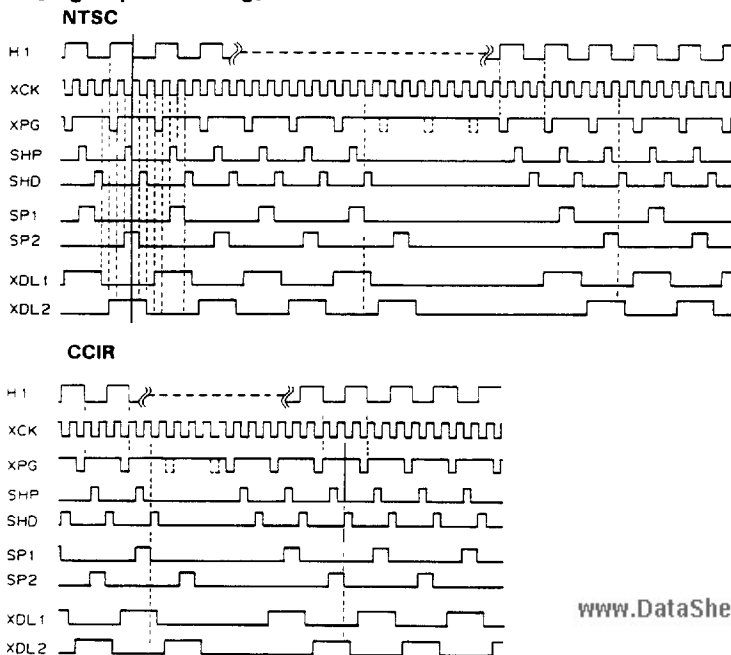
NTSC

CCIR

Timing Chart 2. [NTSC mode]

Timing Chart 3. [CCIR mode]

Timing Chart 4. [NTSC (Low speed timing) B/W mode][1]

VD

HD

xSG1

xSG2

ID[2]

XV4

XV3

XV2

XV1

CCD OUT

CLP1

CLP2

CLP3

PBLK

Note) *1. 1 H advance of the output signal to VD/HD in color mode.

*2. 0 level in monochrome mode.

Timing Chart 5. [CCIR (Low speed timing)][*1]
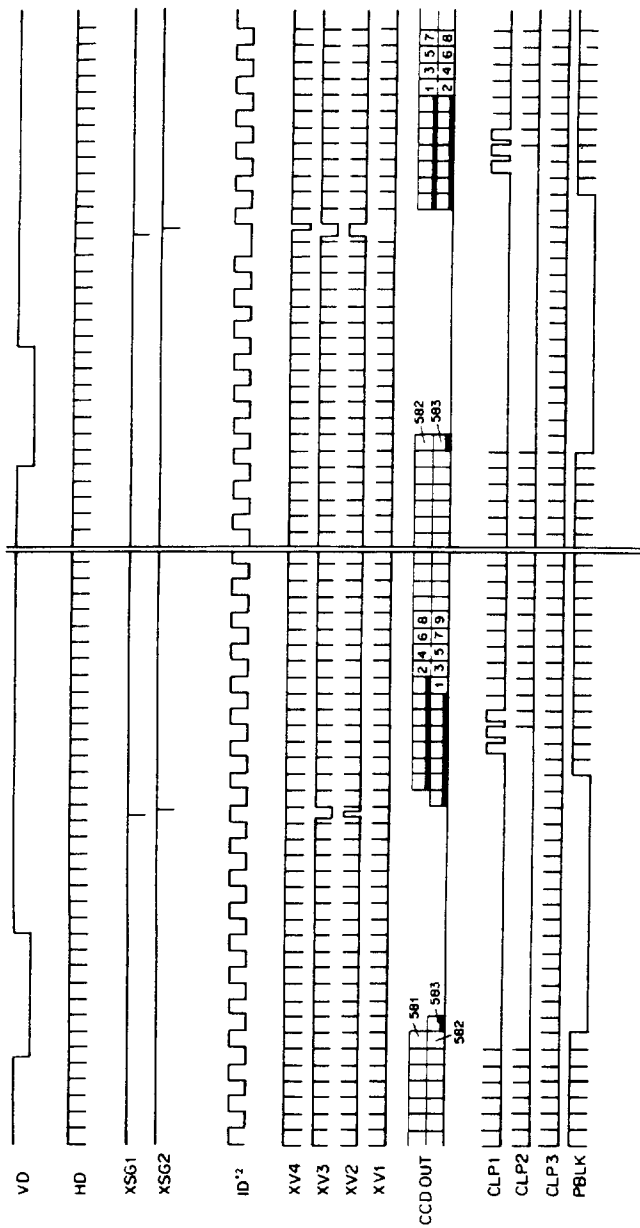
VD

HD

XSG1

XSG2

ID[*2]

XV4

XV3

XV2

XV1

CCDOUT

CLP1

CLP2

CLP3

PBLK

Note) ***1.** 1 H advance of the output signal to VD/HD in color mode.

    *2. 0 level in monochrome mode.

Timing Chart 6. [XV1 to XV4 modulation]