

LZ95G41

Single-chip Driver LSI for CCD

DESCRIPTION

The LZ95G41 is a CMOS single chip driver LSI which provides timing pulses used to drive a CCD area sensor, and generates synchronous pulses for TV signals and processing pulses for video signals.

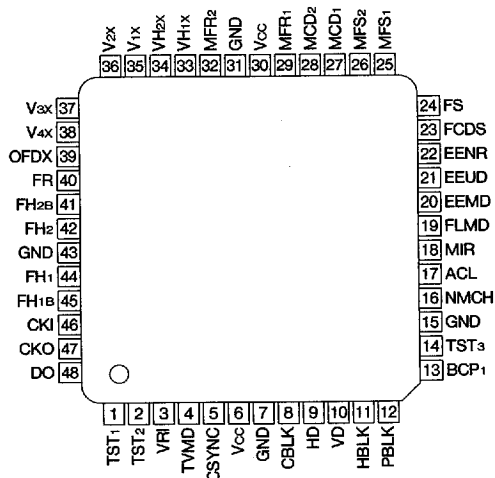
FEATURES

- Switchable between 270 000 pixels B/W CCD and 320 000 pixels B/W CCD
- Switchable between EIA and CCIR systems
- Built-in EE (Electronic Exposure) control (1/60 to 1/50 000 s for EIA; 1/50 to 1/50 000 s for CCIR)
- Flicker-less function
- Switchable between normal and mirror image
- External synchronization is possible
- Single +5 V power supply
- Package : 48-pin QFP(QFP048-P-1010)

PIN CONNECTIONS

48-PIN QFP

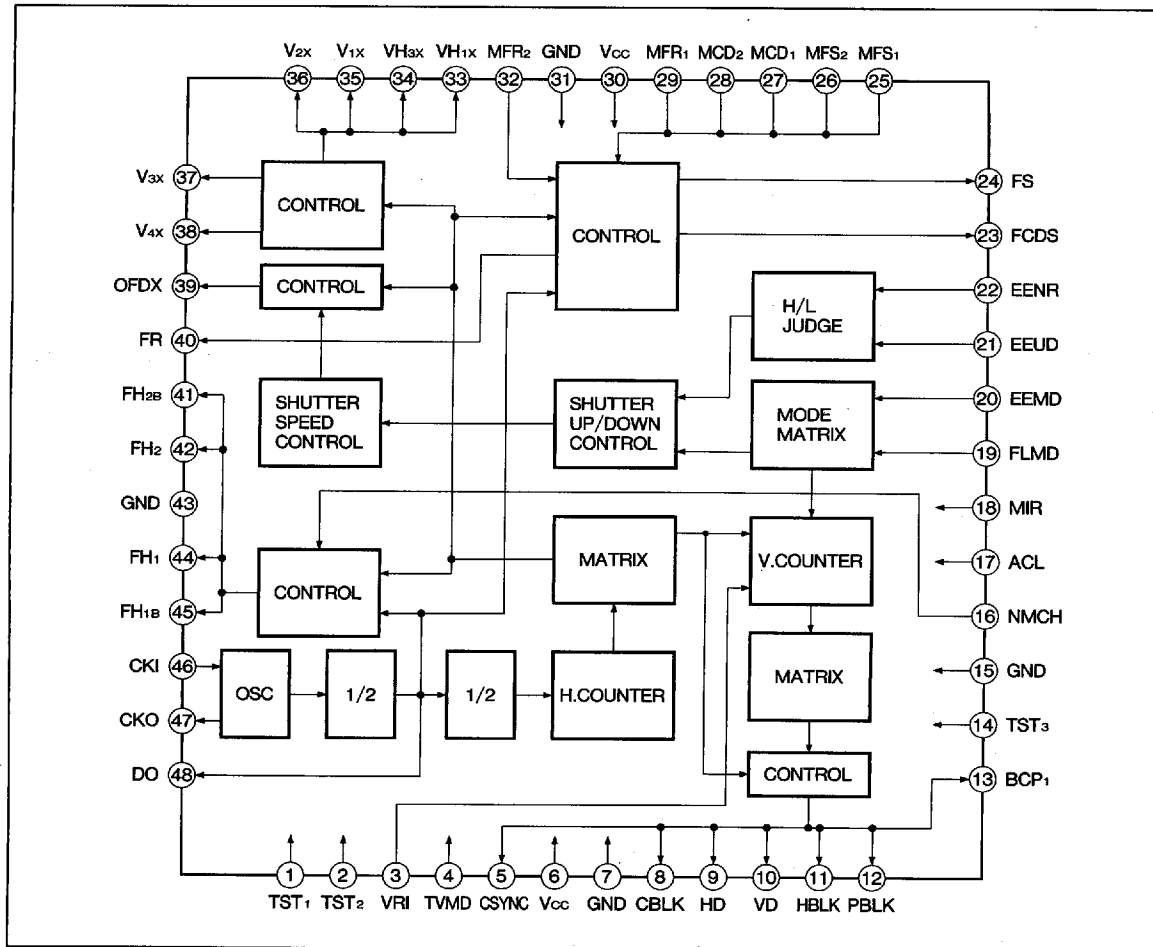
TOP VIEW



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BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Power voltage	V _{CC}	-0.3 to +7.0	V
Input voltage	V _I	-0.3 to V _{CC} +0.3	V
Output voltage	V _O	-0.3 to V _{CC} +0.3	V
Operating temperature	T _{opr}	-30 to +75	°C
Storage temperature	T _{stg}	-55 to +150	°C

DC CHARACTERISTICS

(V_{CC} = +5 V ± 10%, T_a = -30 to +75°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	NOTE
Low level input voltage	V _{IL}				1.5	V	1
High level input voltage	V _{IH}		3.5			V	
Low level output voltage	V _{OL1}	I _{OL} = 3.2 mA			0.4	V	2
High level output voltage	V _{OH1}	I _{OL} = -1.6 mA	4.0			V	
Low level output voltage	V _{OL2}	I _{OL} = 9.6 mA			0.4	V	3
High level output voltage	V _{OH2}	I _{OH} = -4.8 mA	4.0			V	
Low level output voltage	V _{OL3}	I _{OL} = 4.8 mA			0.4	V	4
High level output voltage	V _{OH3}	I _{OH} = -2.4 mA	4.0			V	
Low level output current	I _{IL1}	V _I = 0 V			1.0	μA	5
Low level output current	I _{IL2}	V _I = 0 V	8.0		75	μA	6
High level output current	I _{IH1}	V _I = V _{CC}			1.0	μA	7
High level output current	I _{IH2}	V _I = V _{CC}	8.0		75	μA	8

NOTES :

1. Applied to inputs (IC, ICU, ICD).
2. Applied to output (O).
3. Applied to output (O6M2).
4. Applied to output (O6M).
5. Applied to inputs (IC, ICD).
6. Applied to input (ICU).
7. Applied to inputs (IC, ICU).
8. Applied to input (ICD).

PIN FUNCTION

PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	FUNCTION
1	TST ₁	ICD	—	Test terminal 1	Testing pin. Typically connected to the GND level.
2	TST ₂	ICD	—	Test terminal 2	Testing pin. Typically connected to the GND level.
3	VRI	ICD		Vertical reset input	An input pin for resetting internal vertical counter. The input pulse is necessary 1/2 horizontal max. delay from vertical synchronous start point, because VRI is counted by 2 times horizontal frequency. Set to H level when not resetting.
4	TVMD	ICD	—	TV mode select	An input pin to select TV standards. At EIA mode : H level At CCIR mode : L level
5	CSYNC	O		Composite synchronizing pulse	A composite synchronous signal.
6	Vcc	—	—	Power supply	Supply +5 V power.
7	GND	—	—	Ground	A grounding pin.
8	CBLK	O		Composite blanking pulse	Composite blanking pulses.
9	HD	O		Horizontal drive pulse	The pulse occurs at the start of lines.
10	VD	O		Vertical drive pulse	The pulse occurs at the start of every field.
11	HBLK	O		Horizontal blanking pulse	A pulse that corresponds to the cease period of the horizontal transfer pulse.
12	PBLK	O		Pre-blanking pulse	Equivalent to CBLK (pin 8) pulse except for shorter pulse width with cut-off trailing edge.
13	BCP ₁	O		Optical black clamp pulse	A pulse to clamp the optical black signal.
14	TST ₃	ICD	—	Test terminal 3	Testing pin. Typically connected to the GND level.
15	GND	—	—	Ground	A grounding pin.
16	NMCH	ICU	—	Horizontal transfer pulse 1B, 2B control input	An input pin to select CCD area sensor. At mirror image CCD : H level At normal image CCD : L level
17	ACL	ICU		All clear input	An input pin to reset at power on. For details, see "NOTE 1".
18	MIR	ICU	—	Mirror mode select	An input pin to switch CCD output. At mirror mode : H level At normal mode : L level
19	FLMD	ICU	—	Shutter control 1	For details, see "NOTES 2, 3".
20	EEMD	ICU	—	Electronic Exposure mode select	For details, see "NOTES 2, 3".

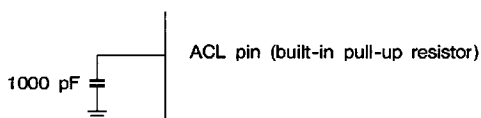
PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	FUNCTION
21	EEUD	IC	—	Electronic Exposure control 1	For details, see "NOTES 2, 3".
22	EENR	IC	—	Electronic Exposure control 2	For details, see "NOTES 2, 3".
23	FCDS	O6M		CDS pulse 1	A pulse to clamp CCD output signals.
24	FS	O6M		CDS pulse 2	A pulse to sampling CCD output signals.
25	MFS ₁	ICU	—	FS phase control 1	An input pin to control FS (pin 24) phase. For details, see "NOTE 4".
26	MFS ₂	ICU	—	FS phase control 2	
27	MCD ₁	ICU	—	FCDS phase control 1	An input pin to control FCDS (pin 23) phase. For details, see "NOTE 4".
28	MCD ₂	ICU	—	FCDS phase control 2	
29	MFR ₁	ICU	—	FR phase control 1	An input pin to control FR (pin 40) phase. For details, see "NOTE 4".
30	V _{CC}	—	—	Power supply	Supply +5 V power.
31	GND	—	—	Ground	A grounding pin.
32	MFR ₂	ICU	—	FR phase control 2	An input pin to control FR (pin 40) phase. For details, see "NOTE 4".
33	VH _{1x}	O		Read out pulse	An output pin to transfer the photodiode charge of CCD to the vertical shift register. To be connected to the 1BX pin of the LR36683N vertical driver LSI.
34	VH _{2x}	O		Read out pulse	An output pin to transfer the photodiode charge of CCD to the vertical shift register. To be connected to the 3BX pin of the LR36683N vertical driver LSI.
35	V _{1x}	O		Vertical transfer pulse 1	Vertical transfer pulse. To be connected to the 1AX pin of the LR36683N vertical driver LSI.
36	V _{2x}	O		Vertical transfer pulse 2	Vertical transfer pulse. To be connected to the 2AX pin of the LR36683N vertical driver LSI.
37	V _{3x}	O		Vertical transfer pulse 3	Vertical transfer pulse. To be connected to the 3AX pin of the LR36683N vertical driver LSI.
38	V _{4x}	O		Vertical transfer pulse 4	Vertical transfer pulse. To be connected to the 4AX pin of the LR36683N vertical driver LSI.
39	OFDX	O		OFD pulse output	An output pin to sweep the photodiode charge of CCD. When FLMD=EEMD=L, a pulse becomes H level signal.

PIN NO.	SYMBOL	I/O	POLARITY	PIN NAME	FUNCTION
40	FR	O6M2		Reset pulse	An output pulse to reset the CCD.
41	FH _{2B}	O6M2		Horizontal transfer pulse 2B	Horizontal transfer pulse. When MIR=L, the phase is the same as at FH ₂ . When MIR=H, the phase is the same as at FH ₁ .
42	FH ₂	O6M2		Horizontal transfer pulse 2	Horizontal transfer pulse.
43	GND	—	—	Ground	A grounding pin.
44	FH ₁	O6M2		Horizontal transfer pulse 1	Horizontal transfer pulse.
45	FH _{1B}	O6M2		Horizontal transfer pulse 1B	Horizontal transfer pulse. When MIR=L, the phase is the same as at FH ₁ . When MIR=H, the phase is the same as at FH ₂ .
46	CKI	ICK		Clock input	A pin for oscillation inverter input. EIA : 1212 fH CCIR : 1236 fH (fH=Horizontal frequency)
47	CKO	OCK		Clock output	A pin for oscillation inverter output.
48	DO	O		Delay-live clock	1/2 frequency output of CKI (pin 46).

IC : Input pin (CMOS level).
 ICU : Input pin (CMOS level with built-in pull-up resistor).
 ICD : Input pin (CMOS level with built-in pull-down resistor).
 ICK : Input pin for oscillation.
 OCK : Output pin for oscillation.
 O : Output pin.
 O6M : Output pin.
 O6M2 : Output pin.

NOTES :

1. How to use ACL pin (Pin 17)



2. Fixed Shutter mode

EEMD (Pin 20)=Low level

FLMD (Pin 19)	SHUTTER SPEED (s)	
	EIA	CCIR
L	1/60	1/50
H	1/100 (Flicker-less)	

3. EE Control mode

EEMD (Pin 20)=Low level

FLMD (Pin 19)	SHUTTER SPEED (s)	
	EIA	CCIR
L	1/60 to 1/30 000	1/50 to 1/30 000
H	1/60 to 1/50 000	1/50 to 1/50 000

EEUD	EENR	
H	L	Shutter speed up
	H	Control stopped
L	H	Shutter speed down

- When EENR and EEUD are H level, control is stopped.
- When either EENR or EEUD is L level, control is resumed.

The shutter speed is changed in the table as shown below.

SHUTTER SPEED (s)	EIA	1/60 to 1/218	to 1/556	to 1/1 100	to 1/2 154
	CCIR	1/50 to 1/216	to 1/552	to 1/1 092	to 1/2 141
CHANGE STEP (s)	EIA	1/1 500	1/3 900	1/7 800	1/15 000
	CCIR	1/1 500	1/3 900	1/7 800	1/15 000
SHUTTER SPEED (s)	EIA	to 1/3 656	to 1/12 070	to 1/51 820	
	CCIR	to 1/3 636	to 1/12 040	to 1/52 480	
CHANGE STEP (s)	EIA	1/31 000	1/63 000	1/126 000	
	CCIR	1/31 000	1/63 000	1/125 000	

4. The phase adjustments should be made with the input combinations as shown in the table.

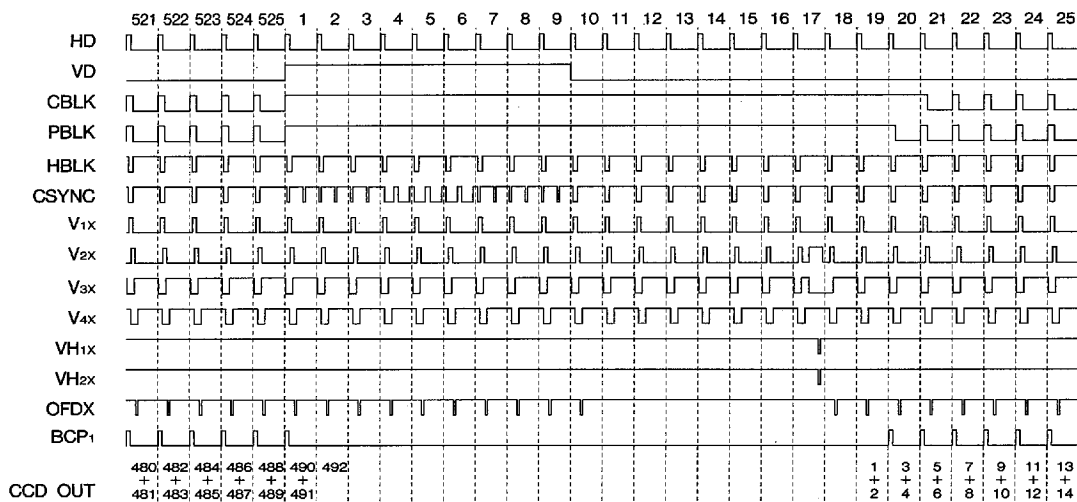
FS PHASE		FCD PHASE		FR PHASE		PHASE DELAY (ns)
MFS ₁	MFS ₂	MCD ₁	MCD ₂	MFR ₁	MFR ₂	
L	L	L	L	L	L	td
L	H	L	H	L	H	td + α
H	L	H	L	H	L	td + 2 α
H	H	H	H	H	H	td + 3 α

TIMING DAIGRAM

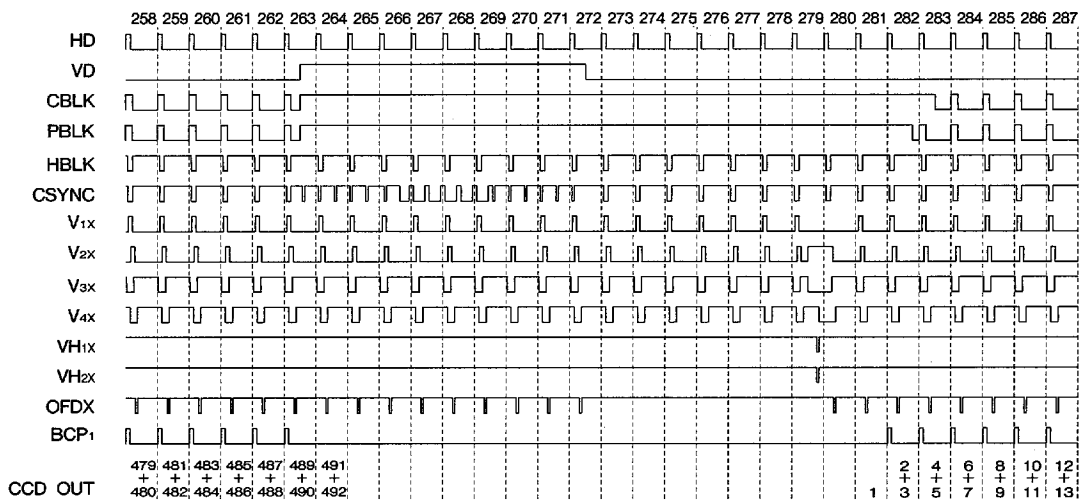
PULSE TIMING CHART < EIA >

Shutter speed
1/2000 s

(ODD FIELD)



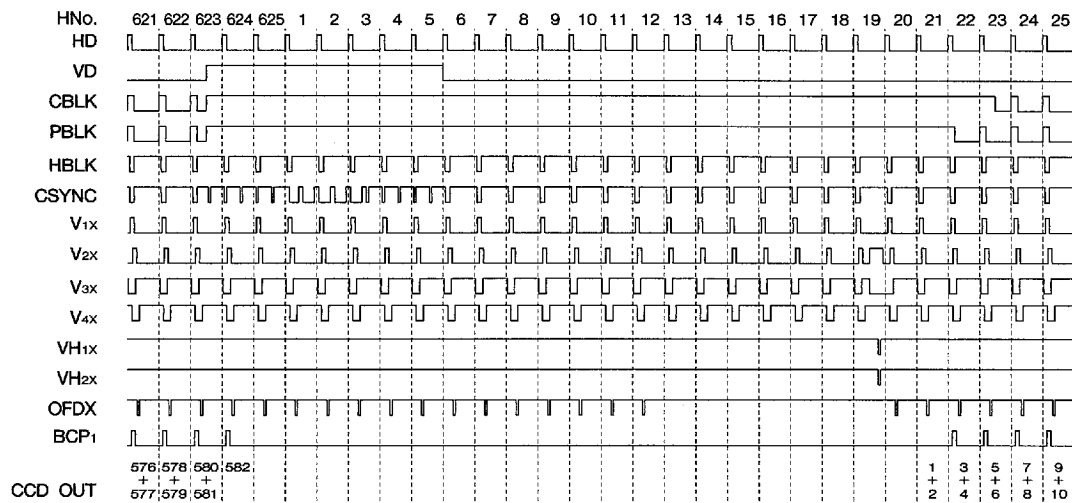
(EVEN FIELD)



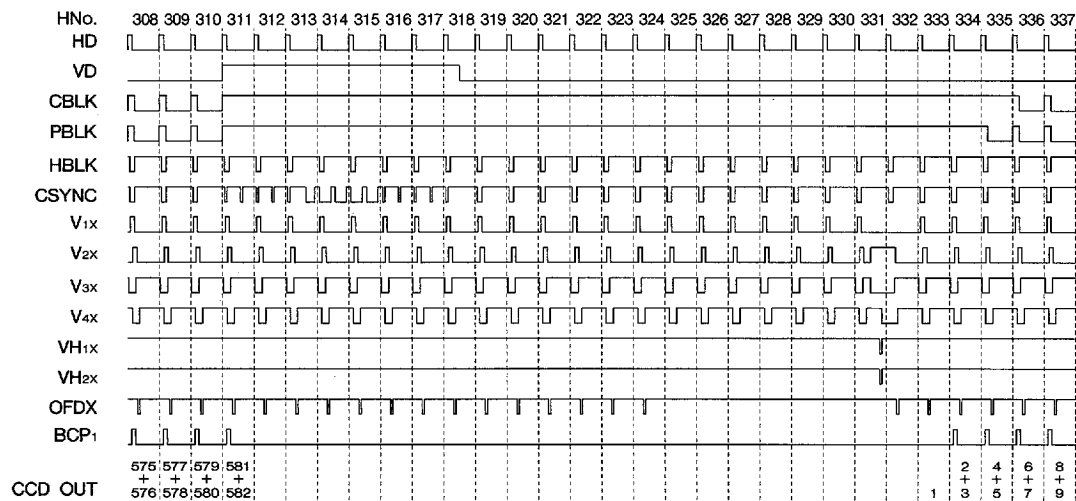
PULSE TIMING CHART < CCIR >

Shutter speed
1/2000 s

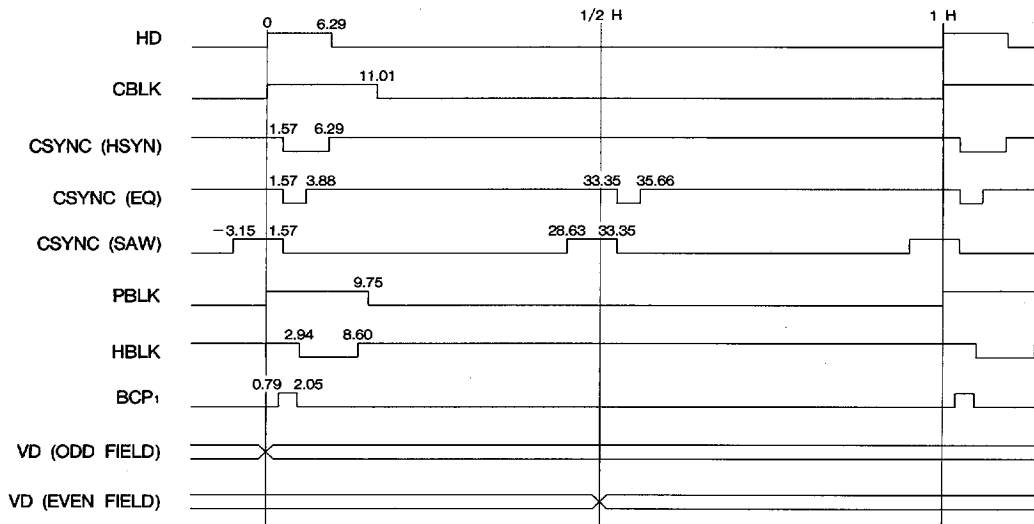
(1st, 3rd FIELD)



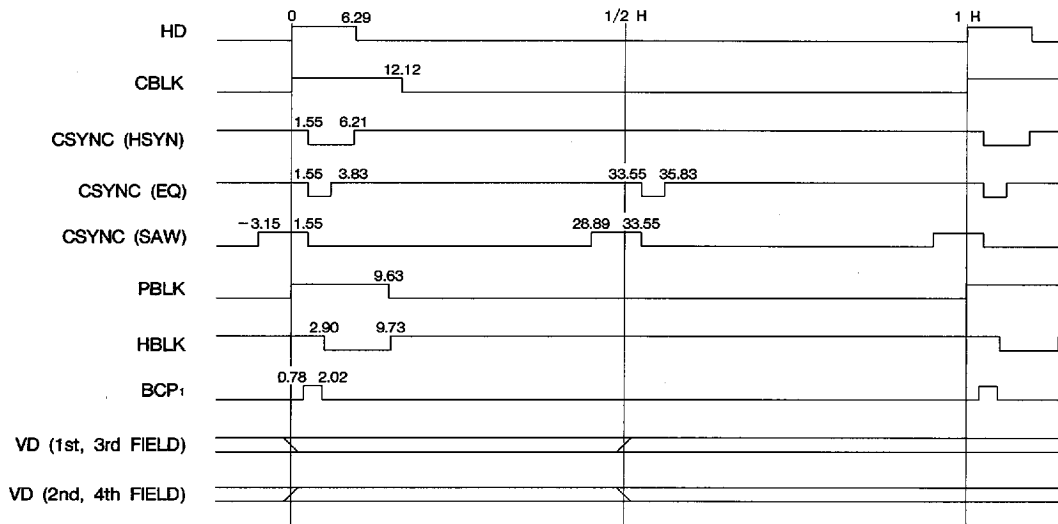
(2nd, 4th FIELD)



PULSE TIMING CHART < EIA >

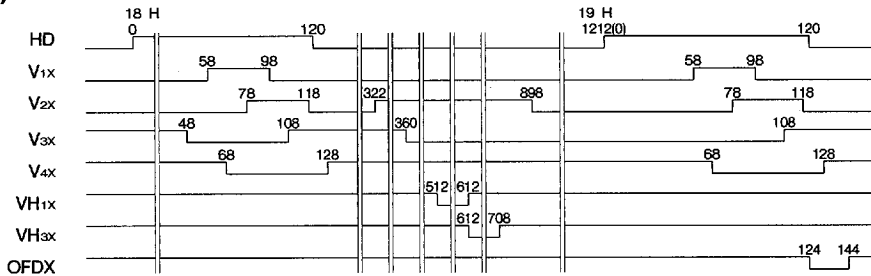
Unit : μs 

PULSE TIMING CHART < CCIR >

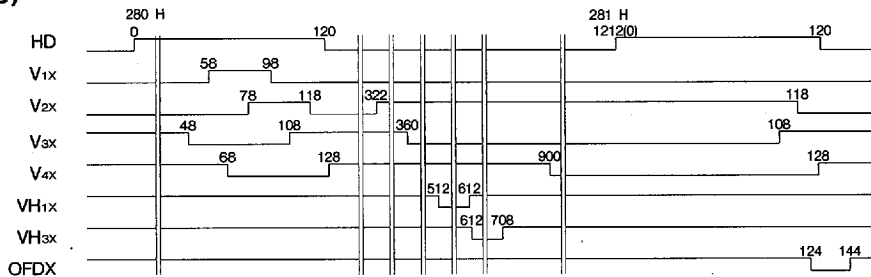


CHARGE READ TIMING < EIA, NORMAL (MIR=L) >

(ODD FIELD)

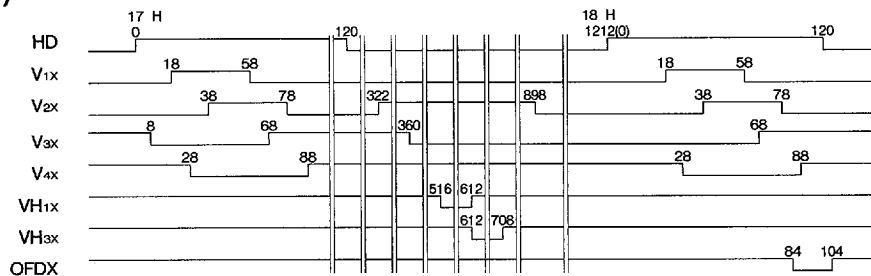


(EVEN FIELD)

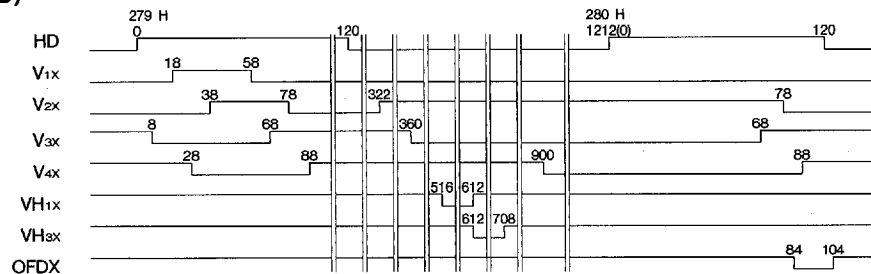


CHARGE READ TIMING < EIA, MIRROR (MIR=H) >

(ODD FIELD)

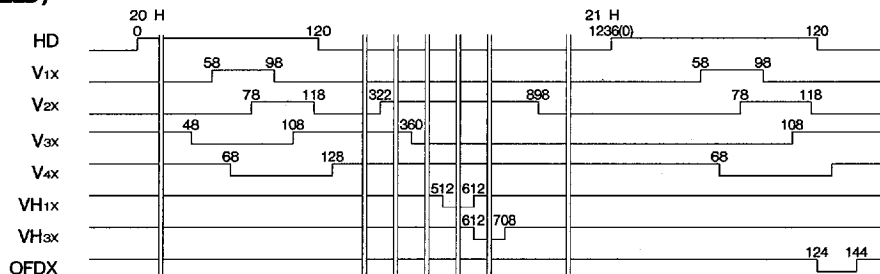


(EVEN FIELD)

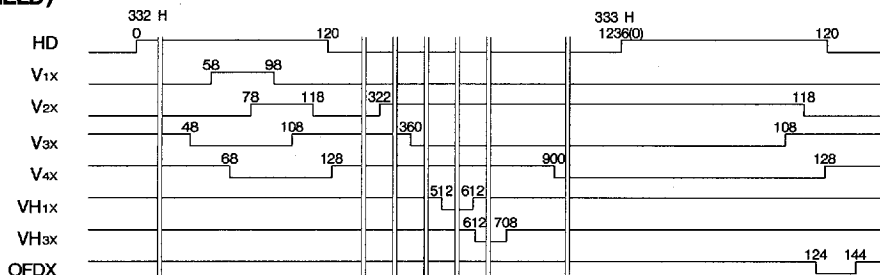


CHARGE READ TIMING < CCIR, NORMAL (MIR=L) >

(1st, 3rd FIELD)

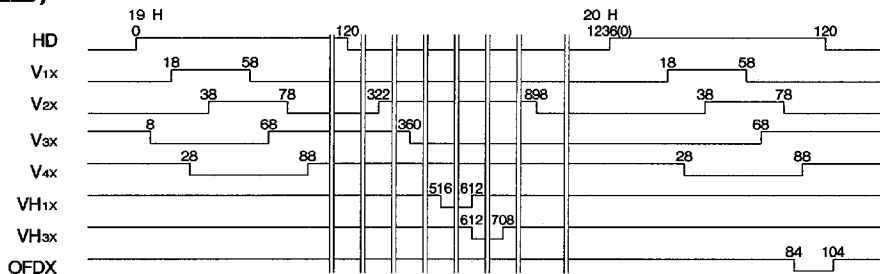


(2nd, 4th FIELD)

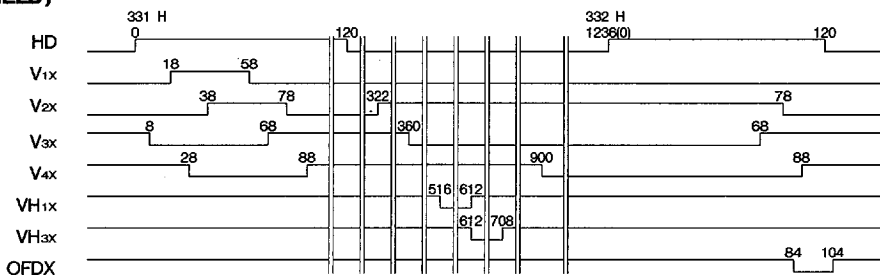


CHARGE READ TIMING < CCIR, MIRROR (MIR=H) >

(1st, 3rd FIELD)

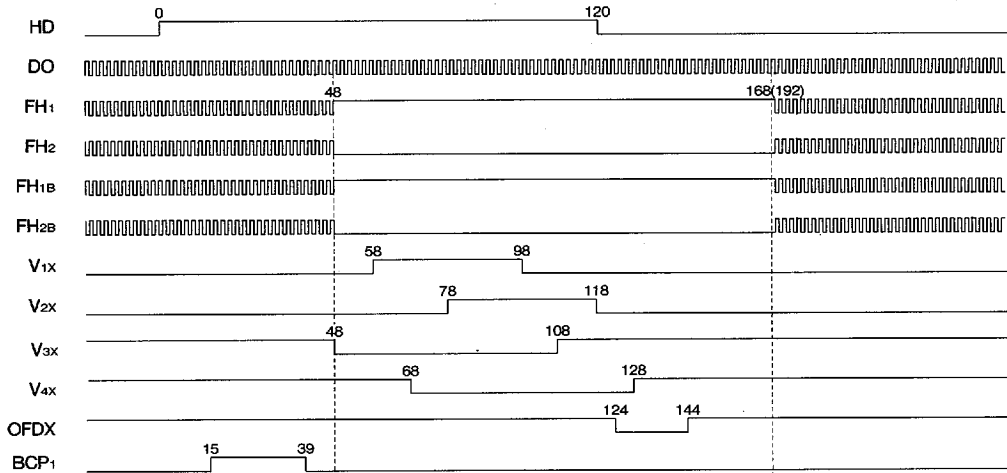


(2nd, 4th FIELD)



HIGH SPEED PULSE TIMING < NORMAL (MIR=L) >

() = CCIR



HIGH SPEED PULSE TIMING < MIRROR (MIR=H) >

() = CCIR

