SHARP

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To ;

PRELIMINARY
SPECIFICATIONS

Product Type Timing IC for Two-power supply 270K/320K pixels color CCD

Model No. LR38613

※This specifications contains 49 pages including the cover and appendix.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

DATE:

BY:

PRESENTED

BY:

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REVIEWED BY:

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● When using the products covered herein, please observe the conditions written herein and the precautions outlined in the following paragraphs. In no event shall the company be liable for any damages resulting from failure to strictly adhere to these conditions and precautions.

(1) The products covered herein are designed and manufactured for the following application areas. When using the products covered herein for the equipment listed in Paragraph (2), even for the following application areas, be sure to observe the precautions given in Paragraph (2). Never use the products for the equipment listed in Paragraph (3).

- ·Office electronics
- ·Instrumentation and measuring equipment
- ·Machine tools
- ·Audiovisual equipment
- ·Home appliances
- ·Communication equipment other than for trunk lines

(2) Those contemplating using the products covered herein for the following equipment which demands high reliability, should first contact a sales representative of the company and then accept responsibility for incorporating into the design fail-safe operation, redundancy, and other appropriate measures for ensuring reliability and safety of the equipment and the overall system.

- ·Control and safety devices for airplanes, trains, automobiles, and other transportation equipment
- ·Mainframe computers
- ·Traffic control systems
- ·Gas leak detectors and automatic cutoff devices
- ·Rescue and security equipment
- ·Other safety devices and safety equipment, etc.

(3) Do not use the products covered herein for the following equipment which demands extremely high performance in terms of functionality, reliability, or accuracy.

- ·Aerospace equipment
- ·Communications equipment for trunk lines
- ·Control equipment for the nuclear power industry
- ·Medical equipment related to life support, etc.

(4) Please direct all queries and comments regarding the interpretation of the above three Paragraphs to a sales representative of the company.

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CONTENTS

1. General

The LR38613 is a CMOS gate array LSI. It generates timing pulses for driving a 2000k pixels CCD area sensor, and processing pulses.

1-1. Features

* The package material is plastic.
* A p-type silicon circuit board is used.
* The package type is 48-pin FQFP
* The process (structure) is CMOS.
* The delay time per 1 gate is 0.4ns.
* Not designed or rated as radiation hardened.

1-2. Functions

* Designed for CCD area sensor LZ21N3V and LZ21N3 with 2,000,000 pixels on 1/2 Format size.
* 3.3V and +4.5V power supply.
* A freqency of driving horizontal CCD is 17.987MHz.
* Both double speed drive monitoring mode and still mode are possible.
* External function control with serial data input is possible.

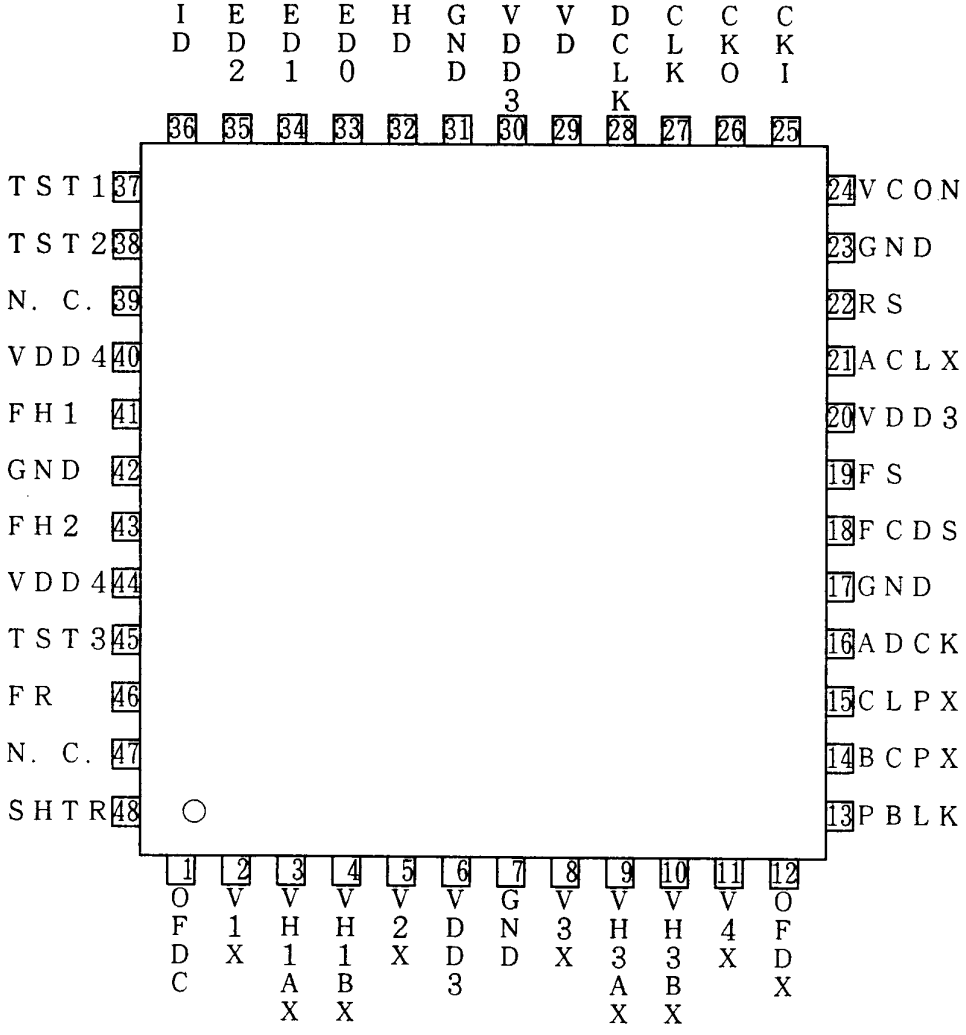
2. Pin Assignment

2-1. Pin Assignment

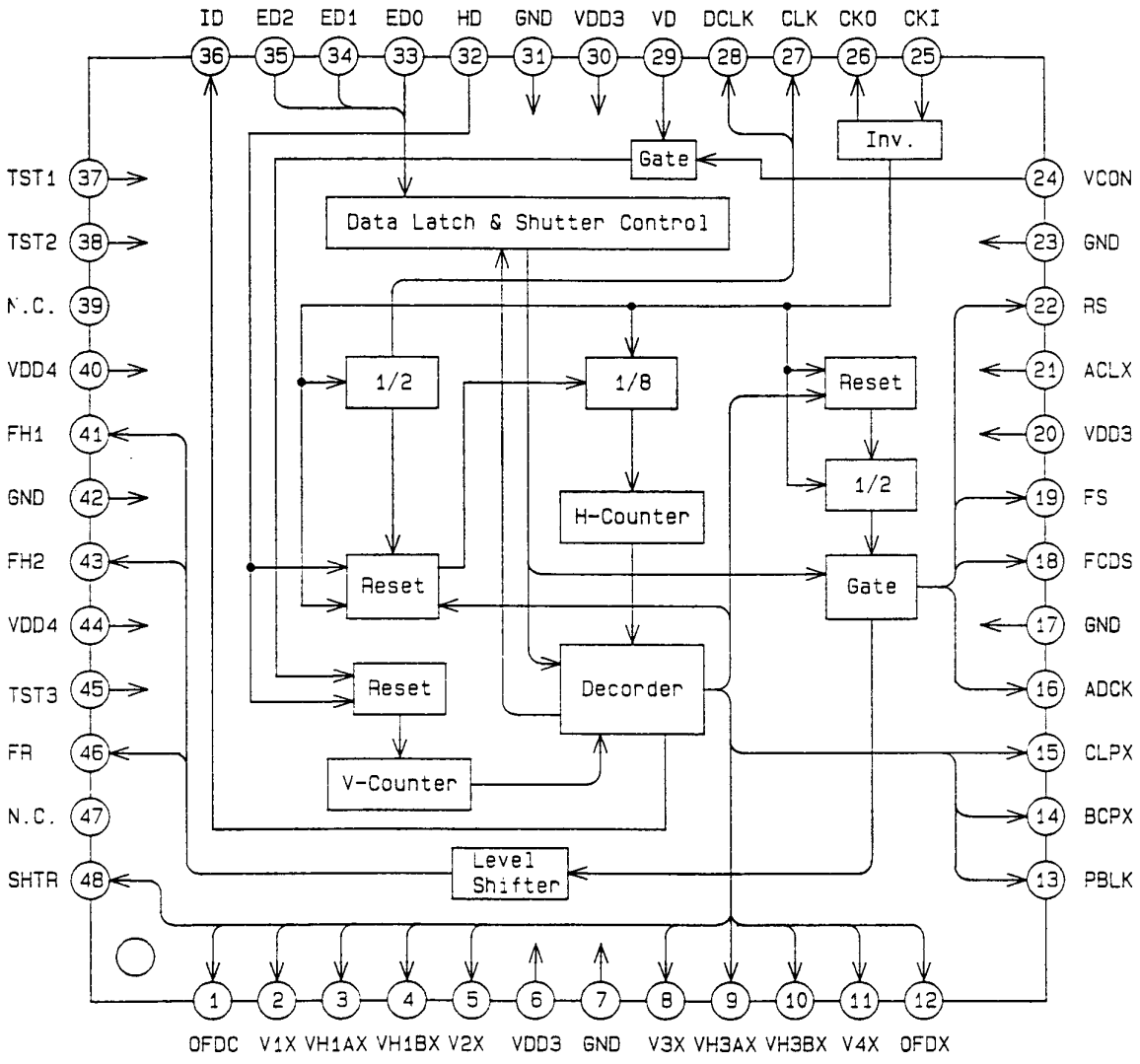
PIN NO.	I／O	SIGNAL	PIN NO.	I／O	SIGNAL
1	O3	OFDC	25	OSCI3	CKI
2	O3	V1X	26	OCSO3	CKO
3	O3	VH1AX	27	O6MA3	CLK
4	O3	VH1BX	28	O6MA3	DCLK
5	O3	V2X	29	IC3	VD
6	−	VDD3	30	−	VDD3
7	−	GND	31	−	GND
8	O3	V3X	32	IC3	HD
9	O3	VH3AX	33	ICSU3	ED0
10	O3	VH3BX	34	ICSU3	ED1
11	O3	V4X	35	ICSU3	ED2
12	O3	OFDX	36	O3	ID
13	O3	PBLK	37	ICD4	TST1
14	O3	BCPX	38	ICD4	TST2
15	O3	CLPX	39	−	N. C.
16	O3	ADCK	40	−	VDD4
17	−	GND	41	O6MA43	FH1
18	O6MA3	FCDS	42	−	GND
19	O6MA3	FS	43	O6MA43	FH2
20	−	VDD3	44	−	VDD4
21	ICU3	ACLX	45	ICD4	TST3
22	O6MA3	RS	46	O6MA43	FR
23	−	GND	47	−	N. C.
24	O3	SHTR	48	ICD3	SHTR

IC3 : Input (CMOS level)
ICU3 : Input (CMOS level with pull-up resister)
ICSU3 : Input (CMOS level with schmitt-trigger)
ICD3 : Input (CMOS level with pull-down resister)
ICU4 : Input (CMOS level with pull-up resister)
ICD4 : Input (CMOS level with pull-down resister)
O3 : Output (Output High level is VDD3)
O6MA3 : Output (Output High level is VDD3)
O6MA43 : Output (Output High level is VDD4)
OSCI3 : Input pin for oscillation
OSCO3 : Output pin for oscillation
VDD3 : +3.3V Power Supply
VDD4 : +4.5V Power Supply

2-2. Pin Configuration (Top View)



3. Block Diagram



4. Pin Description

4-1. Pin description

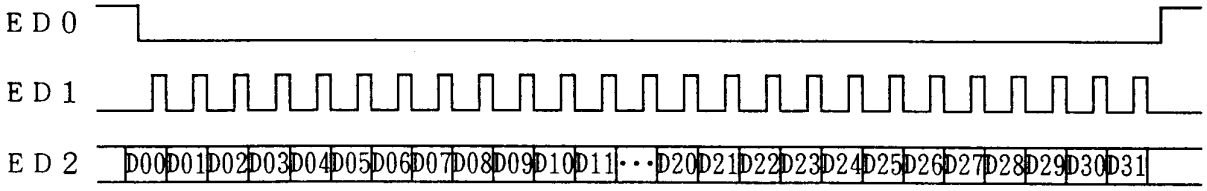
No.	Symbol	I/O	Pol.	Pin Name	Description
1	OFDC	O3	⎍	Control pulse for OFD Voltage	A pulse to contol OFD Voltage.
2	V1X	O3	⎎	Ver. transfer pulse 1	A vertical transfer pulse for CCD. Connect to V Driver IC.
3	VH1AX	O3	⎎	Read out pulse 1A	A pulse that transfers the charge of the photodiode to the vertical shift resister. Connect to V Driver IC.
4	VH1BX	O3	⎎	Read out pulse 1B	A pulse that transfers the charge of the photodiode to the vertical shift resister. Connect to V Driver IC.
5	V2X	O3	⎎	Ver. transfer pulse 2	A vertical transfer pulse for CCD. Connect to V Driver IC.
6	VDD3	–	–	Power supply	Supply +3.3 V power.
7	GND	–	–	Ground	A grounding pin.
8	V3X	O3	⎎	Ver. transfer pulse 3	A vertical transfer pulse for CCD. Connect to V Driver IC.
9	VH3AX	O3	⎎	Read out pulse 3A	A pulse that transfers the charge of the photodiode to the vertical shift resister. Connect to V Driver IC.
10	VH3BX	O3	⎎	Read out pulse 3B	A pulse that transfers the charge of the photodiode to the vertical shift resister. Connect to V Driver IC.
11	V4X	O3	⎎	Ver. transfer pulse 4	A vertical transfer pulse for CCD. Connect to V Driver IC.
12	OFDX	O3	⎎	OFD pulse output	A pulse that sweeps the charge of the photodiode for electrical shutter. Conect to OFD of CCD through the V Driver IC and DC offset circuit. Held at H level at normal mode.
13	PBLK	O3	⎎	Pre-blanking pulse	A pulse for pre-blanking. This pulse stays low during the absence of effective pixels within the ver. blanking or the period of sweepout signal. (see 4-6)
14	BCPX	O3	⎎	Optical black clamp pulse	A pulse to clamp the optical black signal. This pulse stays high during the absence of effective pixels within the ver. blanking or the period of sweepout signal. (see 4-6)
15	CLPX	O3	⎎	Clamp pulse	A pulse to clamp the dummy signal. This pulse stays high during the sweep-out peoriod

No.	Symbol	I/O	Pol.	Pin Name	Description
16	ADCK	O6MA3	⊓⊓	AD Clock	An AD converter clock. The phase is selectable byh serial data control. (See 4-12)
17	GND	—	—	Ground	A grounding pin.
18	FCDS	O6MA3	⊓	CDS pulse 1	A pulse to clamp the feed-through level of the signal from CCD. The phase is selectable by serial data control. (See 4-9)
19	FS	O6MA3	⊓	CDS pulse 2	A pulse to sample-hold the signal from CCD. The phase is selectable byh serial data control. (See 4-10)
20	VDD3	—	—	Power supply	Supply +3.3 V power.
21	ACLX	ICU3	—	All clear input	An input pin for resetting all internal circuit at power on. Connect VDD through the diode and GND through the capacitor.
22	RS	O6MA3	⊓	S/H pulse	A pulse to sample-hold the signal. The phase is selectable by serial data control. (See 4-11)
23	GND	—	—	Ground	A grounding pin.
24	VCON	ICU3	—	VD control	An input pin to control internal vertical clock for long shutter speed. H level or open ; VD L level ; VD is masked by the pulse which is latched by the rising edge of VD. It's neccessary to be set SMD=High and number of the fields data n≧2 in serial data control at VCON operation.
25	CKI	OSCI3	—	Clock input	An input pin for reference clock oscillation. The frequency is 35.874MHz.
26	CKO	OSCO3	—	Clock output	An output pin for reference clock oscillation. The output is the inverse CKI(pin 25).
27	CLK	O6MA3	⊓⊓	Clock output	An output pin to generate HD and VD pulse. The frequency is 17.937MHz.
28	DCLK	O6MA3	⊓⊓	Clock output	An output pin for DSP circuit. The frequency is 17.937MHz. The phase is selectable by serial data control. (See 4-7)

No.	Symbol	I/O	Pol.	Pin Name	Description
29	VD	IC3	⊓	Ver. drive pulse input	An input pin for reference of vertical pulse. The length of low level is 9H. The period is following Still mode ; 656H Monitor. mode ; 262.5H
30	VDD	–	–	Power supply	Supply +3.3 V power.
31	GND	–	–	Ground	A grounding pin.
32	HD	IC3	⊓	Hor. drive pulse input	An input pin for reference of Horizontal pulse. As HD is latched by the rising edge of CLK, HD should be generated by the rising edge of CLK. The period is 2280 clocks.
33	ED0	ICU3	–	Strobe pulse input	An input pin for the strobe pulse to control the functions.
34	ED1	ICU3	–	Shift register clock input	An input pin for the clock of the shift register to control the functions.
35	ED2	ICU3	–	Shift register data input	An input pin for the data of the shift register to control the functions.
36	ID	O3	⊓⊓	Line index pulse	The pulse is used in color separator. The signal switches between high and low at every lines.
37	TST1	ICD4	–	Test terminal 1	A test pin. Set open or to low level in the normal mode.
38	TST2	ICD4	–	Test terminal 2	A test pin. Set open or to low level in the normal mode.
39	NC	–	–	Non connection	Non connection
40	VDD4	–	–	Power supply	Supply +4.5 V power.
41	FH1	O6MA43	⊓⊓	Hor. transfer pulse 1	A horizontal transfer pulse for CCD. Connect to ϕH1 of CCD.
42	GND	-	–	Ground	A grounding pin.
43	FH2	O6MA43	⊓⊓	Hor. transfer pulse 2	A horizontal transfer pulse for CCD. Connect to ϕH2 of CCD.
44	VDD4	-	–	Power supply	Supply +4.5 V power.
45	TST3	ICD4	–	Test terminal 3	A test pin. Set open or to low level in the normal mode.
46	FR	O6MA43	⊓⊓	Reset pulse	A reset pulse for CCD. The phase is selectable by serial data control. (See 4-8)
47	NC	–	–	Non connection	Non connection
48	SHTR	O3	⊓	Trigger output	A trigger pulse for effective signal period.

4-2. Serial data control

(1) Serial data input



The data is shifted by the rising edge of ED1, and latched by the rising edge of ED0. PWSA is effecteive at the rising edge of ED0, but others are effective at the Hori. lines in which VH1AX～VH3BX are active.

ED0 should be Low level during data inputs of ED1, ED2.

As all inner data are set to Low level by ACLX or PWSA, ED0~ED1 should be input for desiable operations.

As all inner data except PWSA are set to Low level by PWSA, ED0~ED1 should be input for desiable operations.

(2) Item of Serial data input

Data	Name	Function	Data=L	Data=H	at ACLX=L
D00 ⟨ D06	SD0 ⟨ SD6	Step of high speed shutter	See the table of Shutter speed control		All L
D07	SD7	Number of exposed fields	See the table of Shutter speed control		All L
D08	SD8				
D09	SD9				
D10	SMD	Electronic shutter mode control	See the table of Shutter mode		L
D11	INMD	Integration mode cont.	Monitoring	Still	L
D12	PWSA	Power save control	Normal	Power save	L
D13	PLCH	Polarity cont. of FCDS, FS, RS pulses	Negative	Positive	L
D14	DUMMY	Dummy	–		–
D15	BCPCNT	BCP control	Uncontinuously	Continuously	L
D16	ML1	Phase cont. of DCLK	See the table of DCLK		L
D17	ML2				L
D18	ML1	Phase cont. of FR	See the table of FR		L
D19	MR2				L
D20	MR3				L
D21	MC1	Phase cont. of FCDS	See the table of FCDS		L
D22	MC2				L
D23	MC3				L
D24	MS1	Phase cont. of FS	See the table of FS		L
D25	MS2				L
D26	MS3				L
D27	MF1	Phase cont. of RS	See the table of RS		L
D28	MF2				L
D29	MF3				L
D30	MA1	Phase cont. of ADCK	See the table of ADCK		L
D31	MA2				L

(3) SD0～SD9, SMD

(3-1) Shutter mode

D10;SMD	Shutter mode	Function
L	OFF	Electronic shutter off
H	ON	It can be possible to use shutter speed select combine with High-speed shutter and Low-speed shutter in monitoring mode. It can be possible to use Low speed shutter speed in still mode.

(3-2) The table of shutter speed

·High speed shutter $1 \leqq n \leqq 118$

·Low speed shutter $0 \leqq n \leqq 7$

D00	D01	D02	D03	D04	D05	D06	D07	D08	D09	D10	No.	Shutter speed (sec)	Notes
SD0	SD1	SD2	SD3	SD4	SD5	SD6	SD7	SD8	SD9	SMD			
×	×	×	×	×	×	×	×	×	×	L	−	1/ 30;Moni.	shutter off
												1/ 15;Still	
L	H	H	L	H	H	H	L	L	L	H	118	1/26,471	High speed shutter
H	L	H	L	H	H	H	L	L	L	H	117	1/23,560	
L	L	H	L	H	H	H	L	L	L	H	116	1/21,951	
H	H	L	L	H	H	H	L	L	L	H	115	1/20,362	
L	H	L	L	H	H	H	L	L	L	H	114	1/18,828	
H	L	L	L	H	H	H	L	L	L	H	113	1/17,375	
L	L	L	L	H	H	H	L	L	L	H	112	1/16,245	
H	H	H	H	L	H	H	L	L	L	H	111	1/15,152	
L	H	H	H	L	H	H	L	L	L	H	110	1/14,107	
H	L	H	H	L	H	H	L	L	L	H	109	1/13,120	
L	L	H	H	L	H	H	L	L	L	H	108	1/12,262	
H	H	L	H	L	H	H	L	L	L	H	107	1/11,392	
L	H	L	H	L	H	H	L	L	L	H	106	1/10,638	
H	L	L	H	L	H	H	L	L	L	H	105	1/ 9,934	
L	L	L	H	L	H	H	L	L	L	H	104	1/ 9,278	
H	H	H	L	L	H	H	L	L	L	H	103	1/ 8,637	
L	H	H	L	L	H	H	L	L	L	H	102	1/ 8,021	
H	L	H	L	L	H	H	L	L	L	H	101	1/ 7,488	
L	L	H	L	L	H	H	L	L	L	H	100	1/ 6,977	
H	H	L	L	L	H	H	L	L	L	H	99	1/ 6,531	
L	H	L	L	L	H	H	L	L	L	H	98	1/ 6,081	
H	L	L	L	L	H	H	L	L	L	H	97	1/ 5,562	
L	L	L	L	L	H	H	L	L	L	H	96	1/ 5,190	
H	H	H	H	H	L	H	L	L	L	H	95	1/ 4,803	
L	H	H	H	H	L	H	L	L	L	H	94	1/ 4,532	
H	L	H	H	H	L	H	L	L	L	H	93	1/ 4,265	
L	L	H	H	H	L	H	L	L	L	H	92	1/ 3,501	
H	H	L	H	H	L	H	L	L	L	H	91	1/ 3,704	
L	H	L	H	H	L	H	L	L	L	H	90	1/ 3,574	
H	L	L	H	H	L	H	L	L	L	H	89	1/ 3,435	

D00 SD0	D01 SD1	D02 SD2	D03 SD3	D04 SD4	D05 SD5	D06 SD6	D07 SD7	D08 SD8	D09 SD9	D10 SMD	No.	Shutter speed (sec)	Notes
L	L	L	H	H	L	H	L	L	L	H	88	1/ 3,217	
H	H	H	L	H	L	H	L	L	L	H	87	1/ 3,034	
L	H	H	L	H	L	H	L	L	L	H	86	1/ 2,879	
H	L	H	L	H	L	H	L	L	L	H	85	1/ 2,709	
L	L	H	L	H	L	H	L	L	L	H	84	1/ 2,521	High speed shutter
H	H	L	L	H	L	H	L	L	L	H	83	1/ 2,394	
L	H	L	L	H	L	H	L	L	L	H	82	1/ 2,242	
H	L	L	L	H	L	H	L	L	L	H	81	1/ 2,080	
L	L	L	L	H	L	H	L	L	L	H	80	1/ 1,947	
H	H	H	H	L	L	H	L	L	L	H	79	1/ 1,837	
L	H	H	H	L	L	H	L	L	L	H	78	1/ 1,716	
H	L	H	H	L	L	H	L	L	L	H	77	1/ 1,607	
L	L	H	H	L	L	H	L	L	L	H	76	1/ 1,490	
H	H	L	H	L	L	H	L	L	L	H	75	1/ 1,409	
L	H	L	H	L	L	H	L	L	L	H	74	1/ 1,335	
H	L	L	H	L	L	H	L	L	L	H	73	1/ 1,253	
L	L	L	H	L	L	H	L	L	L	H	72	1/ 1,171	
H	H	H	L	L	L	H	L	L	L	H	71	1/ 1,082	
L	H	H	L	L	L	H	L	L	L	H	70	1/ 1,020	
H	L	H	L	L	L	H	L	L	L	H	69	1/ 951	
L	L	H	L	L	L	H	L	L	L	H	68	1/ 903	
H	H	L	L	L	L	H	L	L	L	H	67	1/ 849	
L	H	L	L	L	L	H	L	L	L	H	66	1/ 810	
H	L	L	L	L	L	H	L	L	L	H	65	1/ 767	
L	L	L	L	L	L	H	L	L	L	H	64	1/ 735	
H	H	H	H	H	H	L	L	L	L	H	63	1/ 699	
L	H	H	H	H	H	L	L	L	L	H	62	1/ 672	
H	L	H	H	H	H	L	L	L	L	H	61	1/ 642	
L	L	H	H	H	H	L	L	L	L	H	60	1/ 594	
H	H	L	H	H	H	L	L	L	L	H	59	1/ 526	
L	H	L	H	H	H	L	L	L	L	H	58	1/ 516	
H	L	L	H	H	H	L	L	L	L	H	57	1/ 484	
L	L	L	H	H	H	L	L	L	L	H	56	1/ 456	
H	H	H	L	H	H	L	L	L	L	H	55	1/ 431	
L	H	H	L	H	H	L	L	L	L	H	54	1/ 409	
H	L	H	L	H	H	L	L	L	L	H	53	1/ 389	
L	L	H	L	H	H	L	L	L	L	H	52	1/ 371	
H	H	L	L	H	H	L	L	L	L	H	51	1/ 354	
L	H	L	L	H	H	L	L	L	L	H	60	1/ 339	
H	L	L	L	H	H	L	L	L	L	H	49	1/ 325	
L	L	L	L	H	H	L	L	L	L	H	48	1/ 312	
H	H	H	H	L	H	L	L	L	L	H	47	1/ 300	
L	H	H	H	L	H	L	L	L	L	H	46	1/ 279	
H	L	H	H	L	H	L	L	L	L	H	45	1/ 261	
L	L	H	H	L	H	L	L	L	L	H	44	1/ 244	

D00	D01	D02	D03	D04	D05	D06	D07	D08	D09	D10	No.	Shutter speed	Notes
SD0	SD1	SD2	SD3	SD4	SD5	SD6	SD7	SD8	SD9	SMD		(sec)	
H	H	L	H	L	H	L	L	L	L	H	43	1/ 230	
L	H	L	H	L	H	L	L	L	L	H	42	1/ 217	
H	L	L	H	L	H	L	L	L	L	H	41	1/ 206	
L	L	L	H	L	H	L	L	L	L	H	40	1/ 196	
H	H	H	L	L	H	L	L	L	L	H	39	1/ 187	
L	H	H	L	L	H	L	L	L	L	H	38	1/ 178	High speed shutter
H	L	H	L	L	H	L	L	L	L	H	37	1/ 171	
L	L	H	L	L	H	L	L	L	L	H	36	1/ 163	
H	H	L	L	L	H	L	L	L	L	H	35	1/ 157	
L	H	L	L	L	H	L	L	L	L	H	34	1/ 151	
H	L	L	L	L	H	L	L	L	L	H	33	1/ 145	
L	L	L	L	L	H	L	L	L	L	H	32	1/ 135	
H	H	H	H	H	L	L	L	L	L	H	31	1/ 127	
L	H	H	H	H	L	L	L	L	L	H	30	1/ 119	
H	L	H	H	H	L	L	L	L	L	H	29	1/ 112	
L	L	H	H	H	L	L	L	L	L	H	28	1/ 106	
H	H	L	H	H	L	L	L	L	L	H	27	1/ 101	
L	H	L	H	H	L	L	L	L	L	H	26	1/ 96	
H	L	L	H	H	L	L	L	L	L	H	25	1/ 91	
L	L	L	H	H	L	L	L	L	L	H	24	1/ 87	
H	H	H	L	H	L	L	L	L	L	H	23	1/ 84	
L	H	H	L	H	L	L	L	L	L	H	22	1/ 80	
H	L	H	L	H	L	L	L	L	L	H	21	1/ 77	
L	L	H	L	H	L	L	L	L	L	H	20	1/ 74	
H	H	L	L	H	L	L	L	L	L	H	19	1/ 69	
L	H	L	L	H	L	L	L	L	L	H	18	1/ 65	
H	L	L	L	H	L	L	L	L	L	H	17	1/ 61	
L	L	L	L	H	L	L	L	L	L	H	16	1/ 57	
H	H	H	H	L	L	L	L	L	L	H	15	1/ 54	
L	H	H	H	L	L	L	L	L	L	H	14	1/ 51	
H	L	H	H	L	L	L	L	L	L	H	13	1/ 49	
L	L	H	H	L	L	L	L	L	L	H	12	1/ 46	
H	H	L	H	L	L	L	L	L	L	H	11	1/ 44	
L	H	L	H	L	L	L	L	L	L	H	10	1/ 42	
H	L	L	H	L	L	L	L	L	L	H	9	1/ 41	
L	L	L	H	L	L	L	L	L	L	H	8	1/ 39	
H	H	H	L	L	L	L	L	L	L	H	7	1/ 38	
L	H	H	L	L	L	L	L	L	L	H	6	1/ 36	
H	L	H	L	L	L	L	L	L	L	H	5	1/ 35	
L	L	H	L	L	L	L	L	L	L	H	4	1/ 34	
H	H	L	L	L	L	L	L	L	L	H	3	1/ 33	
L	H	L	L	L	L	L	L	L	L	H	2	1/ 32	
H	L	L	L	L	L	L	L	L	L	H	1	1/ 31	

D00 SD0	D01 SD1	D02 SD2	D03 SD3	D04 SD4	D05 SD5	D06 SD6	D07 SD7	D08 SD8	D09 SD9	D10 SMD	No.	Shutter speed (sec)	Notes
×	×	×	×	×	×	×	L	L	L	H	–	1 field	Low speed shutter
×	×	×	×	×	×	×	H	L	L	H	–	2 fields	
×	×	×	×	×	×	×	L	H	L	H	–	3 fields	
×	×	×	×	×	×	×	H	H	L	H	–	4 fields	
×	×	×	×	×	×	×	L	L	H	H	–	5 fields	
×	×	×	×	×	×	×	H	L	H	H	–	6 fields	
×	×	×	×	×	×	×	L	H	H	H	–	7 fields	
×	×	×	×	×	×	×	H	H	H	H	–	8 fields	

(4) INMD [D11]

H level input ; CCD outputs the data for Still picture.

L level input ; CCD outputs the data for Monitoring picture.

(5) PWSA [D12]

H level input ; The power save function is operated.

CKO, CLK ; Operate

Other outputs ; L level outputs

L level input ; All outputs are operate.

(6) BCPCNT [D15]

Control BCPX(pin14)

L level ; Held to H level at ver. blanking period and sweep-out.

H level ; Held to H level at sweep-out period.

(7) ML1, ML2 [D16, D17]

ML1 [D16]	L	H	L	H
ML2 [D17]	L	L	H	H
Phase	0°	90°	180°	270°

(8) MR1, MR2, MR3 [D18, D19, D20]

MR1 [D18]	L	H	L	H	L	H	L	H
MR2 [D19]	L	L	H	H	L	L	H	H
MR3 [D20]	L	L	L	L	H	H	H	H
Phase	A	A+α	A+2α	A+3α	A+4α	A+5α	A+6α	A+7α

(9) MC1, MC2, MC3 [D21, D22, D23]

MC1 [D21]	L	H	L	H	L	H	L	H
MC2 [D22]	L	L	H	H	L	L	H	H
MC3 [D23]	L	L	L	L	H	H	H	H
Phase	A	A+α	A+2α	A+3α	A+4α	A+5α	A+6α	A+7α

(10) MS1, MS2, MS3項目 [D24, D25, D26]

MS1 [D24]	L	H	L	H	L	H	L	H
MS2 [D25]	L	L	H	H	L	L	H	H
MS3 [D26]	L	L	L	L	H	H	H	H
Phase	A	A+α	A+2α	A+3α	A+4α	A+5α	A+6α	A+7α

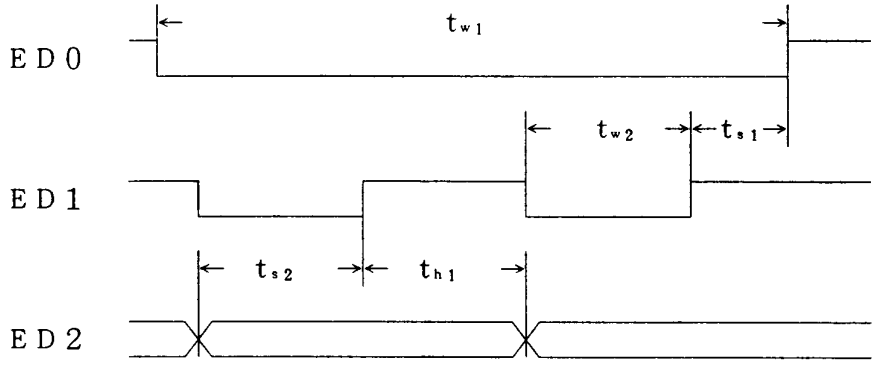
(11) MF1, MF2, MF3 [D27, D28, D29]

MF1 [D27]	L	H	L	H	L	H	L	H
MF2 [D28]	L	L	H	H	L	L	H	H
MF3 [D29]	L	L	L	L	H	H	H	H
Phase	A	A+α	A+2α	A+3α	A+4α	A+5α	A+6α	A+7α

(12) MA1, MA2 [D30, D31]

MA1 [D30]	L	H	L	H
MA2 [D31]	L	L	H	H
Phase	0°	90°	180°	270°

(13) Input characteristics of serial data



Symbol	Definition	Min.	Max.
t_{w1}	Pulse width of ED0	*	–
t_{w2}	Pulse width of ED1	20ns	–
t_{s1}	The rising set-up of ED0 regard with the rising edge of ED1	20ns	–
t_{s2}	The rising set-up of ED2 regard with the rising edge of ED1	20ns	–
t_{h1}	The hold-time of ED2 regard with the rising edge of ED1	20ns	–

* t_{w1} ; The period of the effective data inputs at ED1, ED2

5. Electorical Characteristics

5-1. Absolute Maximum Ratings

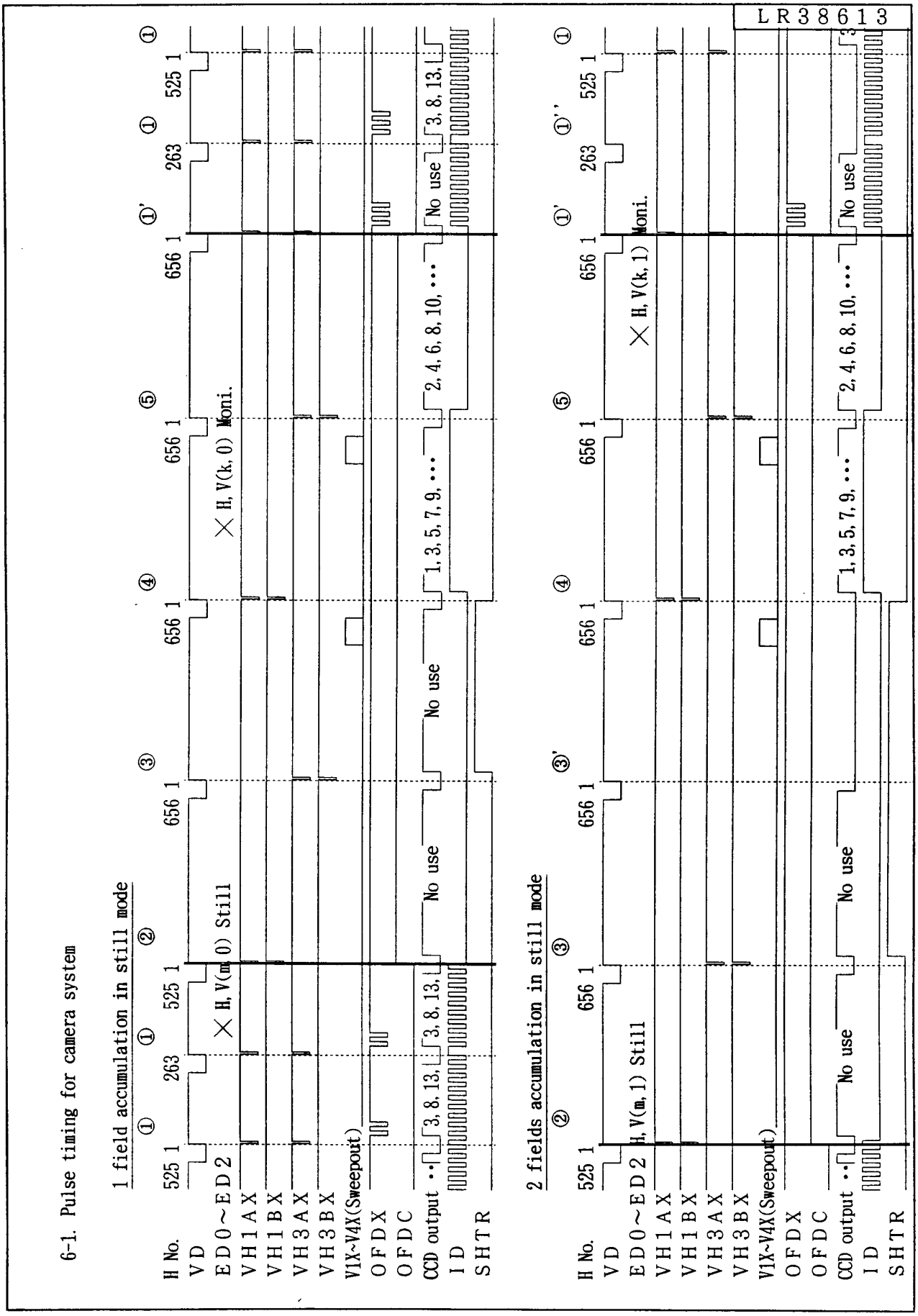
Parameter	Symbol	Rating	Unit
Supply voltage	V_{DD3}, V_{DD4}	−0.3 ~ 6.07	V
Input voltage	V_{In} (n=3,4)	−0.3 ~ V_{DDn}+0.3	V
Output voltage	V_{On} (n=3,4)	−0.3 ~ V_{DDn}+0.3	V
Operation temperature	T_{opr}	−20 ~ +70	℃
Storage tempetature	T_{stg}	−55 ~ +150	℃

5-2. DC Characteristics (V_{DD3}, $_{3A}$=3.0V~V_{DD4}, V_{DD4}=4.2V~5.5V, T_{opr}=-20~+70℃)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Note
Input "High" voltage	V_{IH3}		0.8×V_{DD3}			V	1, 2,
Input "Low" voltage	V_{IL3}				0.2×V_{DD3}	V	4
Input "High" voltage	V_{IH4}				0.75×V_{DD3}	V	
Input "Low" voltage	V_{IL4}	Schmitt-buffer	0.2×V_{DD3}			V	3
Hysterisis voltage	V_{T+}-V_{T-}		0.08×V_{DD3}			V	
Input "High" voltage	V_{IH4}		0.8×V_{DD4}			V	5, 6
Input "Low" voltage	V_{IL4}				0.2×V_{DD4}	V	
Input "High" current	$\|I_{IH3-1}\|$	V_I = V_{DD3} V			1.0	μA	1
Input "Low" current	$\|I_{IL3-1}\|$	V_I = 0 V			1.0	μA	
Input "High" current	$\|I_{IH3-2}\|$	V_I = V_{DD3} V			2.0	μA	2, 3
Input "Low" current	$\|I_{IL3-2}\|$	V_I = 0 V	2.0		30	μA	
Input "High" current	$\|I_{IH3-3}\|$	V_I = V_{DD3} V	2.0		30	μA	4
Input "Low" current	$\|I_{IL3-3}\|$	V_I = 0 V			2.0	μA	
Input "High" current	$\|I_{IH4-1}\|$	V_I = V_{DD4} V	4.0		60	μA	5
Input "Low" current	$\|I_{IL4-1}\|$	V_I = 0 V			2.0	μA	
Input "High" current	$\|I_{IH4-2}\|$	V_I = V_{DD4} V	4.0		60	μA	6
Input "Low" current	$\|I_{IL4-2}\|$	V_I = 0 V			2.0	μA	
Output "High" voltage	V_{OH3-1}	I_{OH} = −1mA	V_{DD3}-0.5			V	7
Output "Low" voltage	V_{OL3-1}	I_{OL} = 2mA			0.4	V	
Output "High" voltage	V_{OH3-2}	I_{OH} = −3mA	V_{DD3}-0.5			V	8
Output "Low" voltage	V_{OL3-2}	I_{OL} = 3mA			0.4	V	
Output "High" voltage	V_{OH4}	I_{OH} = −10mA	V_{DD4}-0.5			V	9
Output "Low" voltage	V_{OL4}	I_{OL} = 10mA			0.4	V	

Note 1 : Applied to Inputs(IC3, OSCI33).
Note 2 : Applied to Inputs(ICU3).
Note 3 : Applied to Input(ICSU3).
Note 4 : Applied to Inputs(ICD3).
Note 5 : Applied to Inputs(ICU3).
Note 6 : Applied to Inputs(ICD4).
Note 7 : Applied to (O3).
Note 8 : Applied to (OSCO3).
(Output(OSCO3) measures on conditions that input(OSCI3) level is 0V or V_{DD3}.)
Note 9 : Applied to Output(O6MA43).

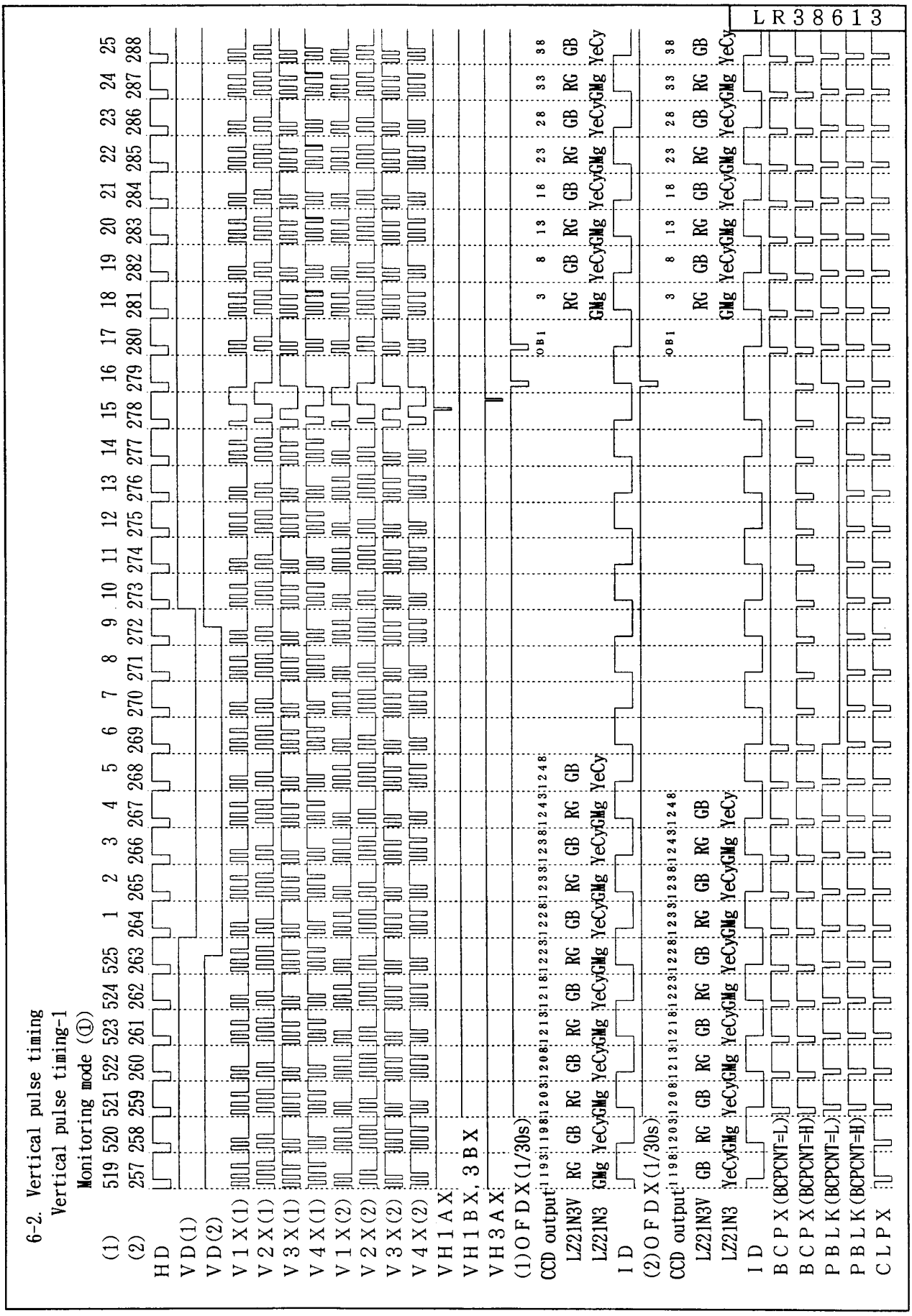
6-1. Pulse timing for camera system



6-2. Vertical pulse timing

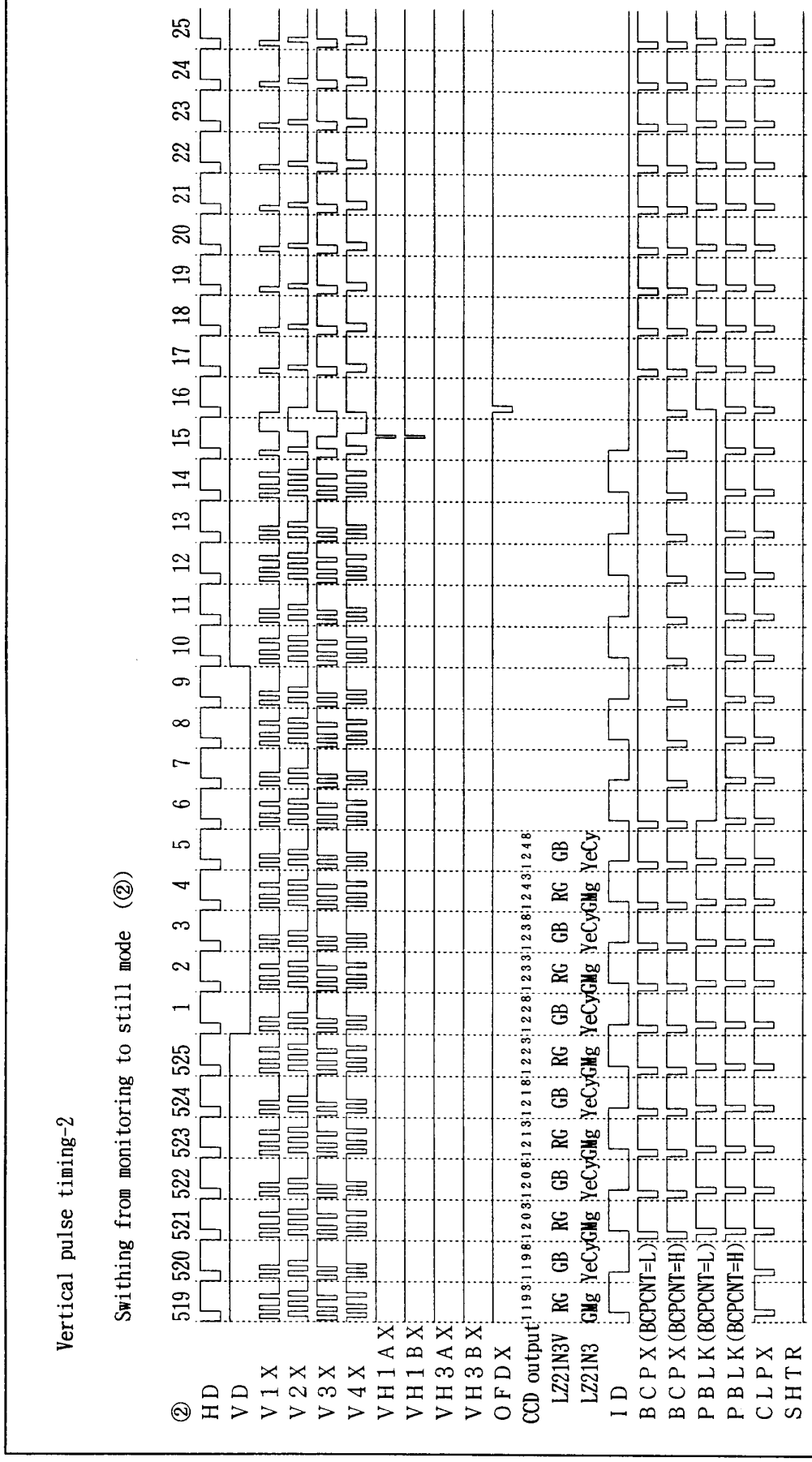
Vertical pulse timing-1

Monitoring mode (①)



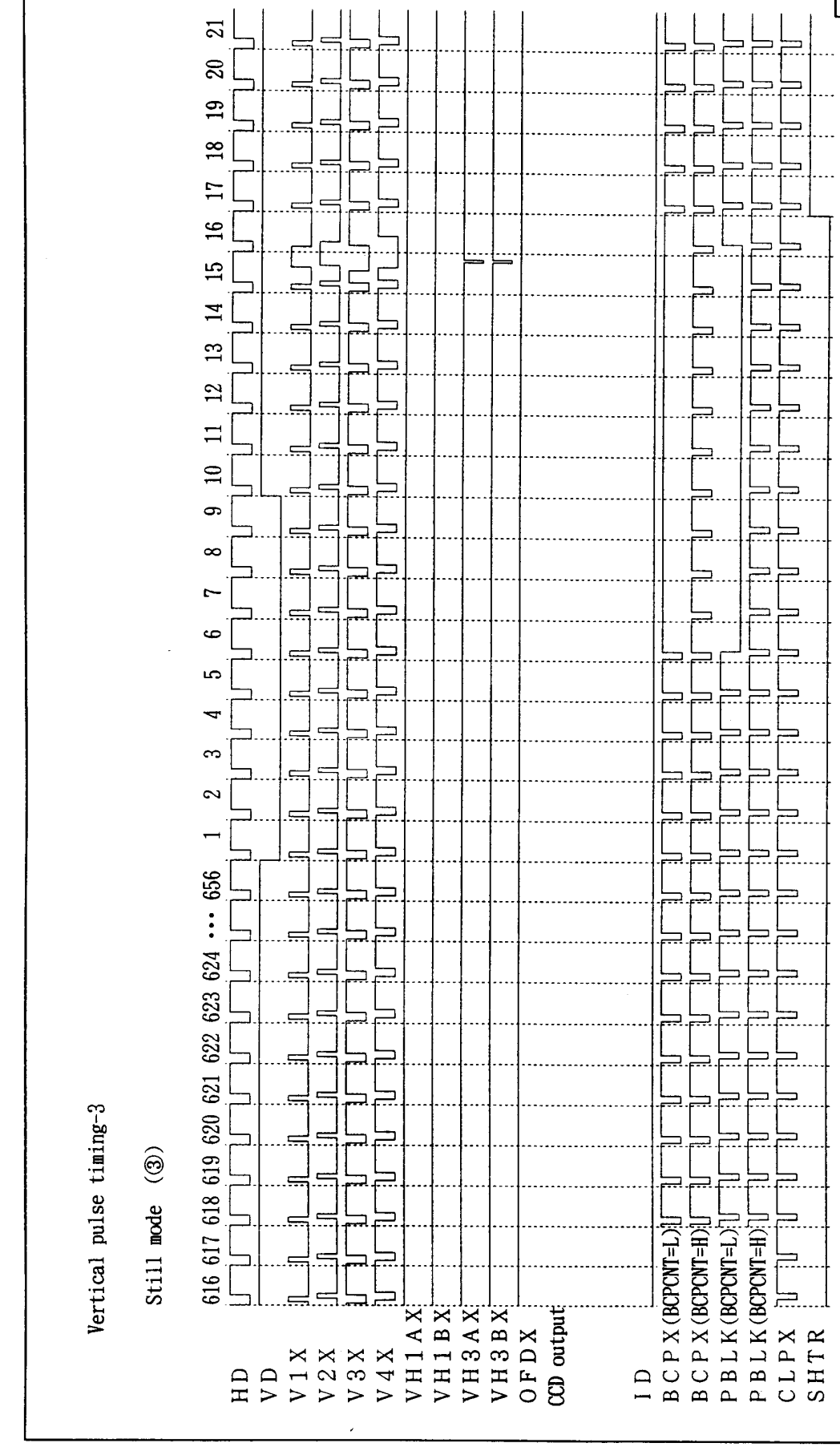
Vertical pulse timing-2

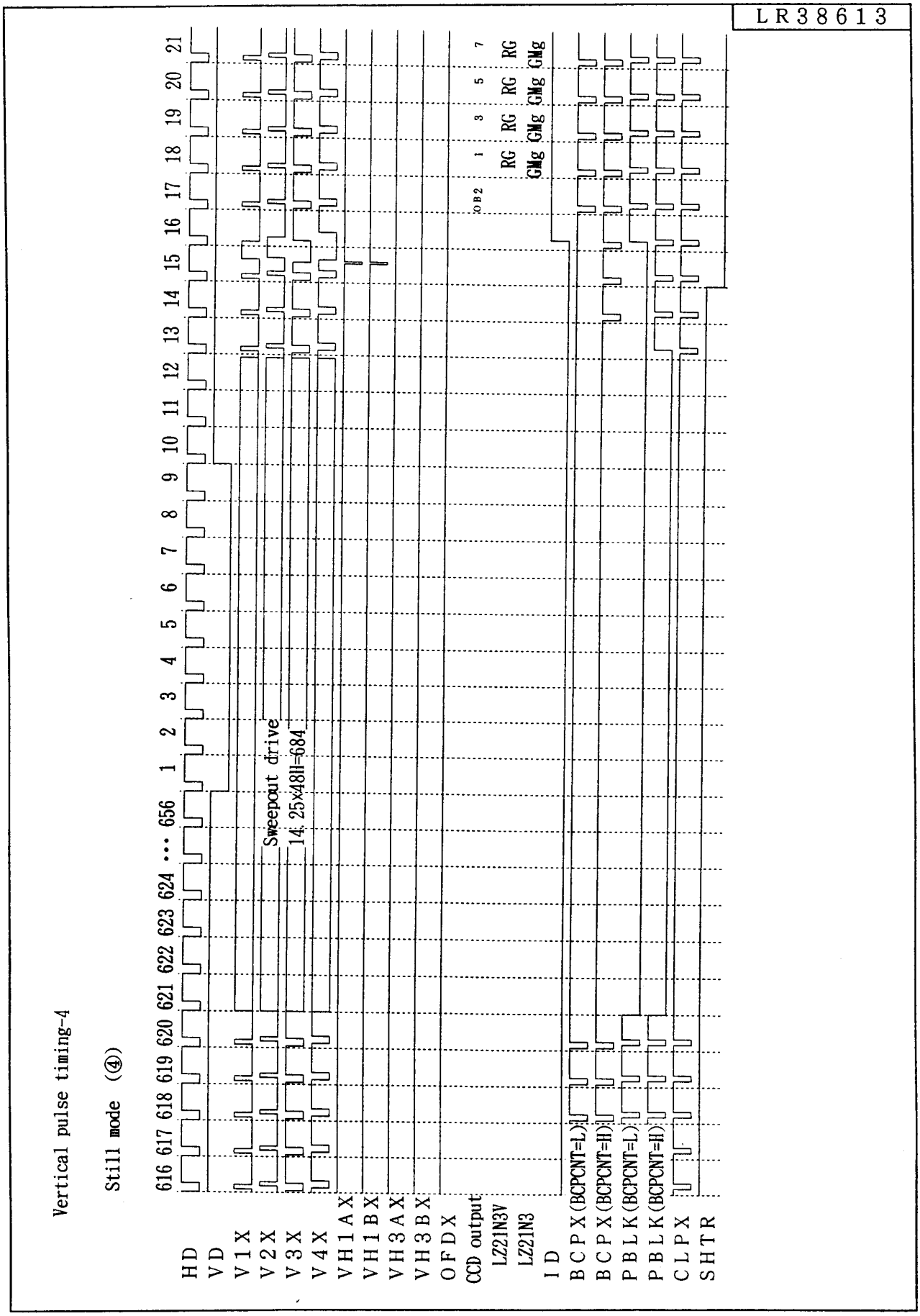
Swithing from monitoring to still mode (②)

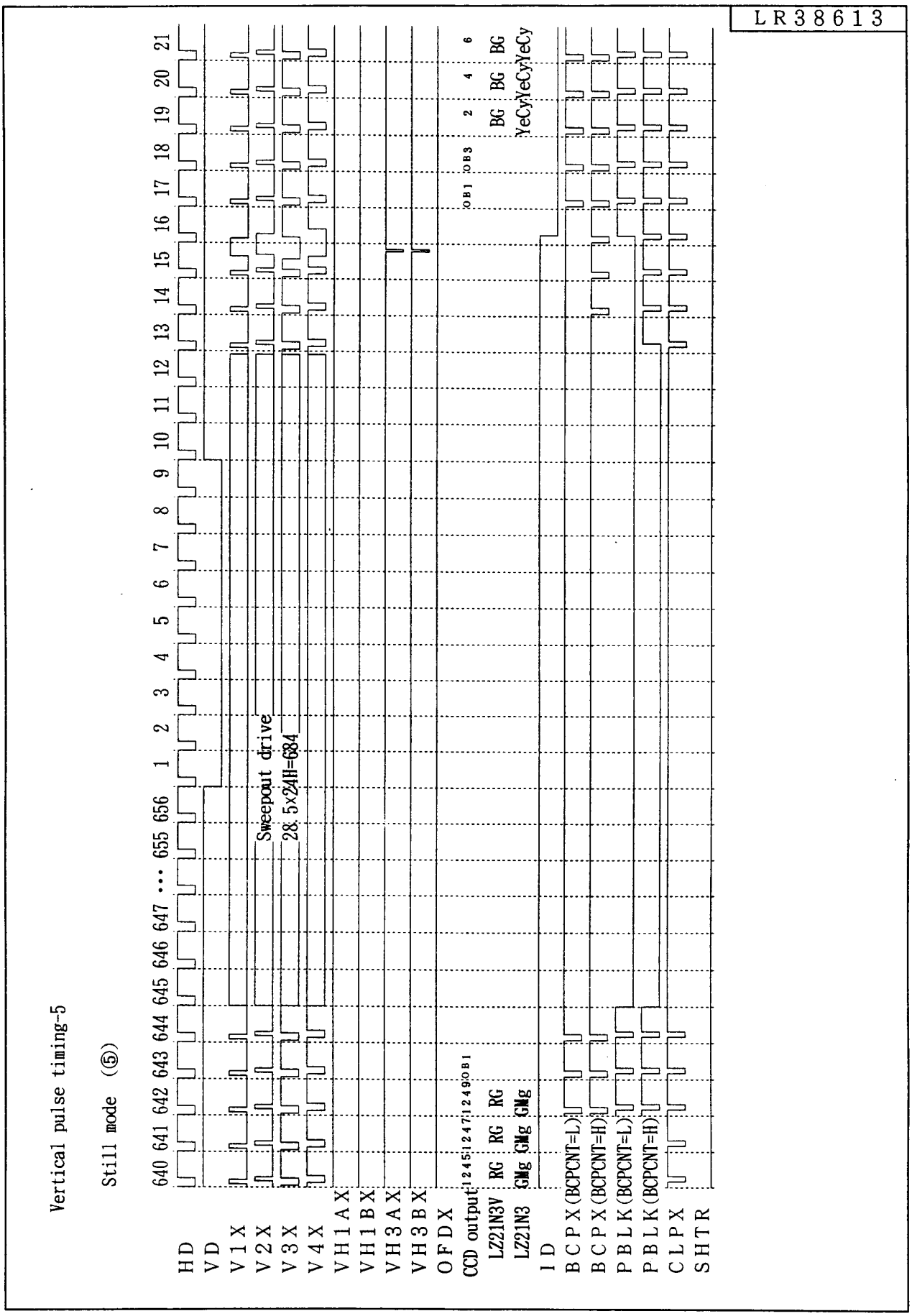


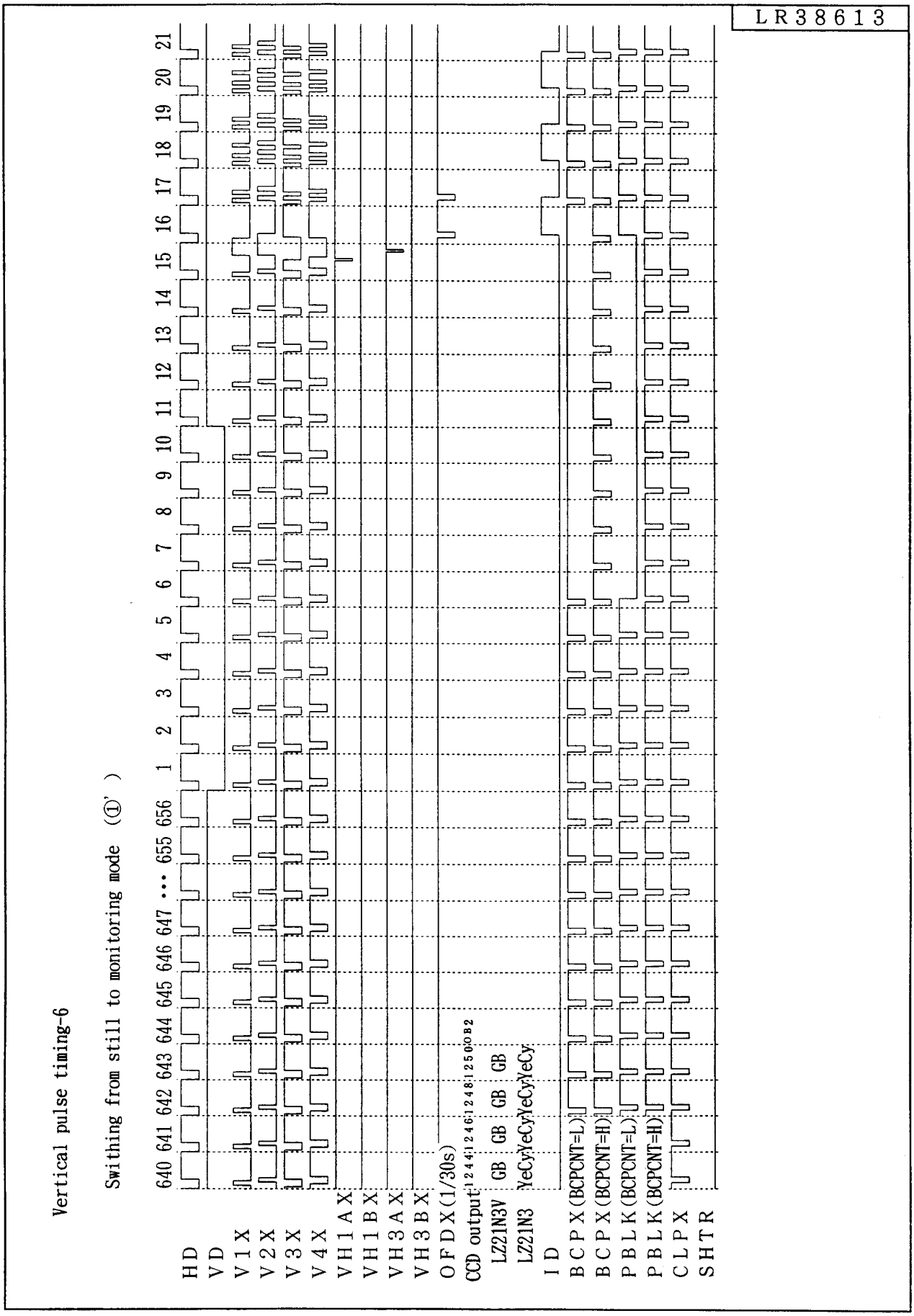
Vertical pulse timing-3

Still mode (③)



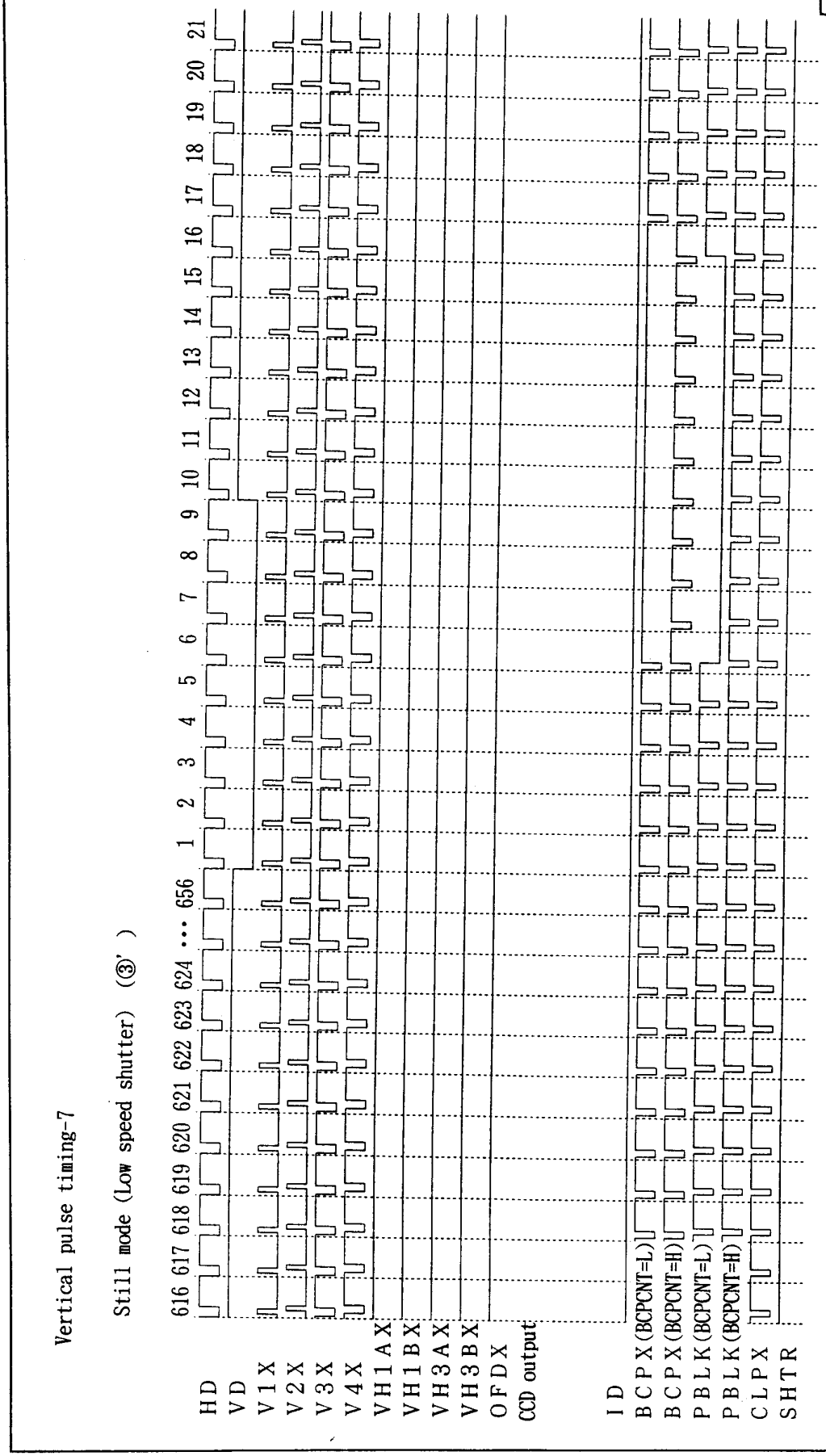

LR38613
Vertical pulse timing-4
Still mode (④)
616 617 618 619 620 621 622 623 624 ••• 656 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
HD
VD
V1X
V2X
V3X
V4X
VH1AX
VH1BX
VH3AX
VH3BX
OFDX
CCD output
LZ21N3V
LZ21N3
ID
BCPX(BCPCNT=L)
BCPX(BCPCNT=H)
PBLK(BCPCNT=L)
PBLK(BCPCNT=H)
CLPX
SHTR
Sweepout drive
14, 25×481H=684
OB2
1 3 5 7
RG RG RG RG
GMg GMg GMg GMg


LR38613
Vertical pulse timing-5
Still mode (⑤)
640 641 642 643 644 645 646 647 ... 655 656 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
HD
VD
V1X
V2X
V3X
V4X
VH1AX
VH1BX
VH3AX
VH3BX
OFDX
CCD output
LZ21N3V
LZ21N3
ID
BCPX(BCPCNT=L)
BCPX(BCPCNT=H)
PBLK(BCPCNT=L)
PBLK(BCPCNT=H)
CLPX
SHTR
Sweepout drive
28.5×24H=684
RG
GMg
BG
YeCy

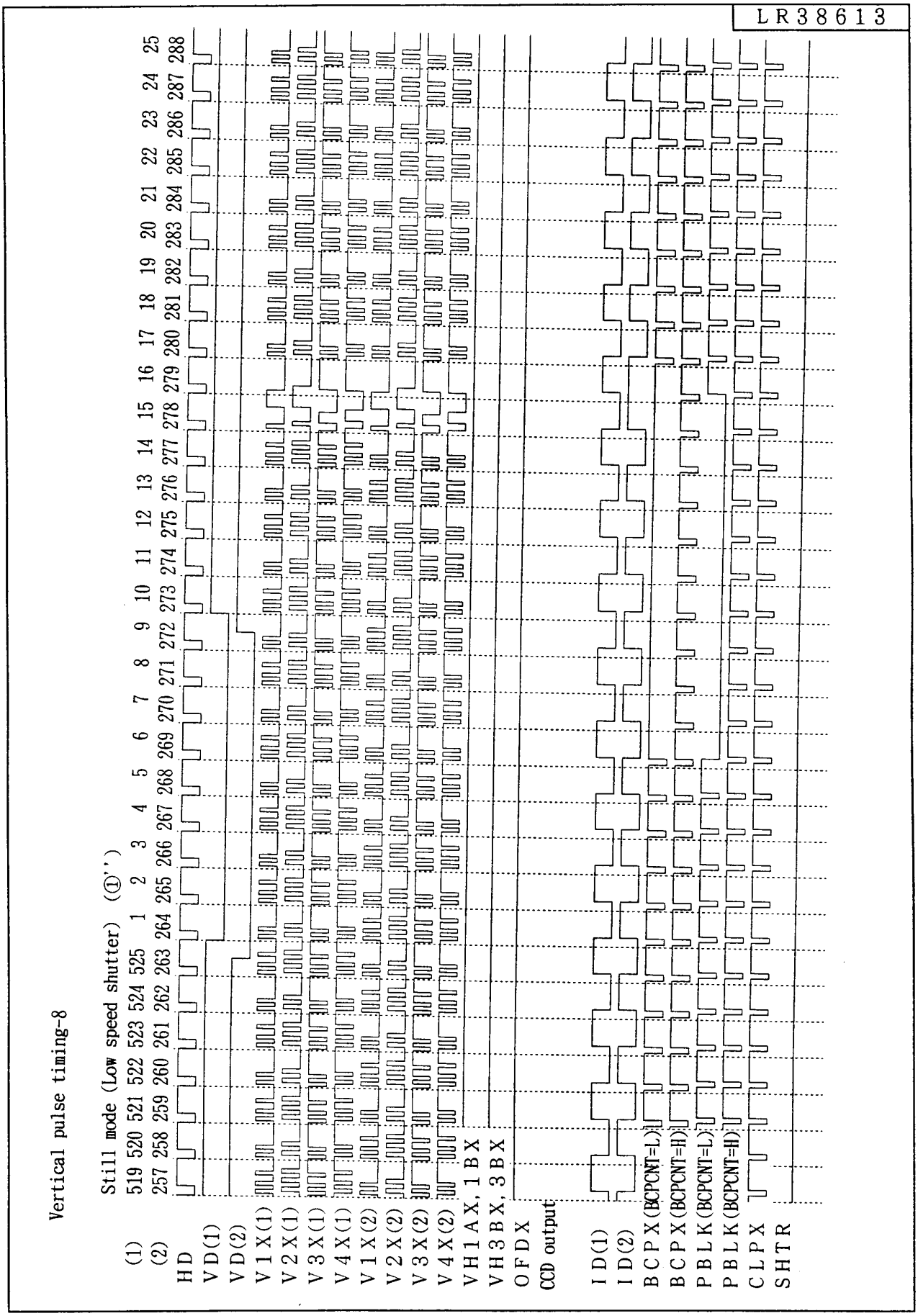

LR38613
Vertical pulse timing-6
Swithing from still to monitoring mode (①')
640 641 642 643 644 645 646 647 ••• 655 656 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
HD
VD
V1X
V2X
V3X
V4X
VH1AX
VH1BX
VH3AX
VH3BX
OFDX(1/30s)
CCD output
LZ21N3V GB GB GB GB
LZ21N3 YeCy YeCy YeCy YeCy YeCy
ID
BCPX(BCPCNT=L)
BCPX(BCPCNT=H)
PBLK(BCPCNT=L)
PBLK(BCPCNT=H)
CLPX
SHTR

Vertical pulse timing-7

Still mode (Low speed shutter) (③')

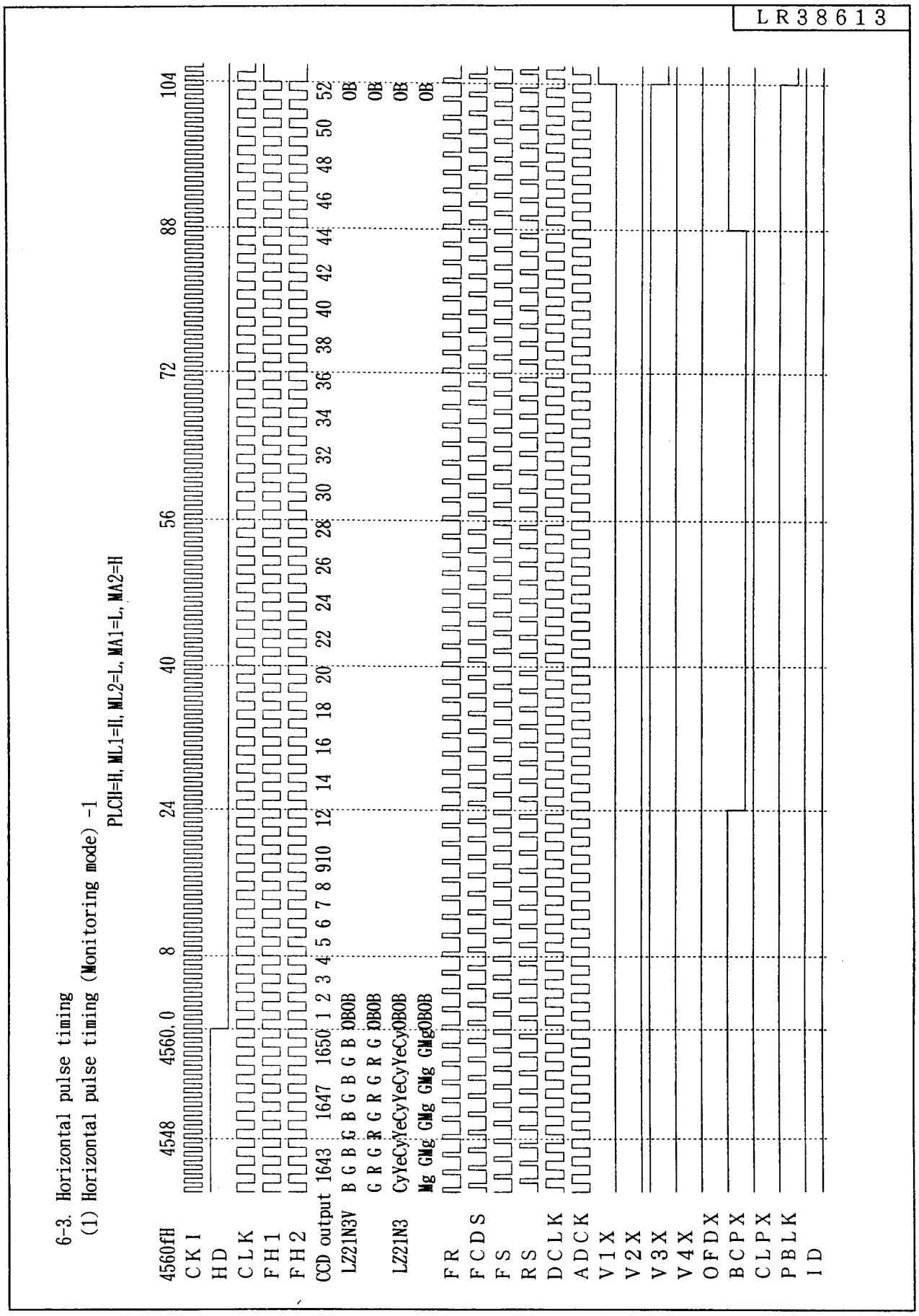


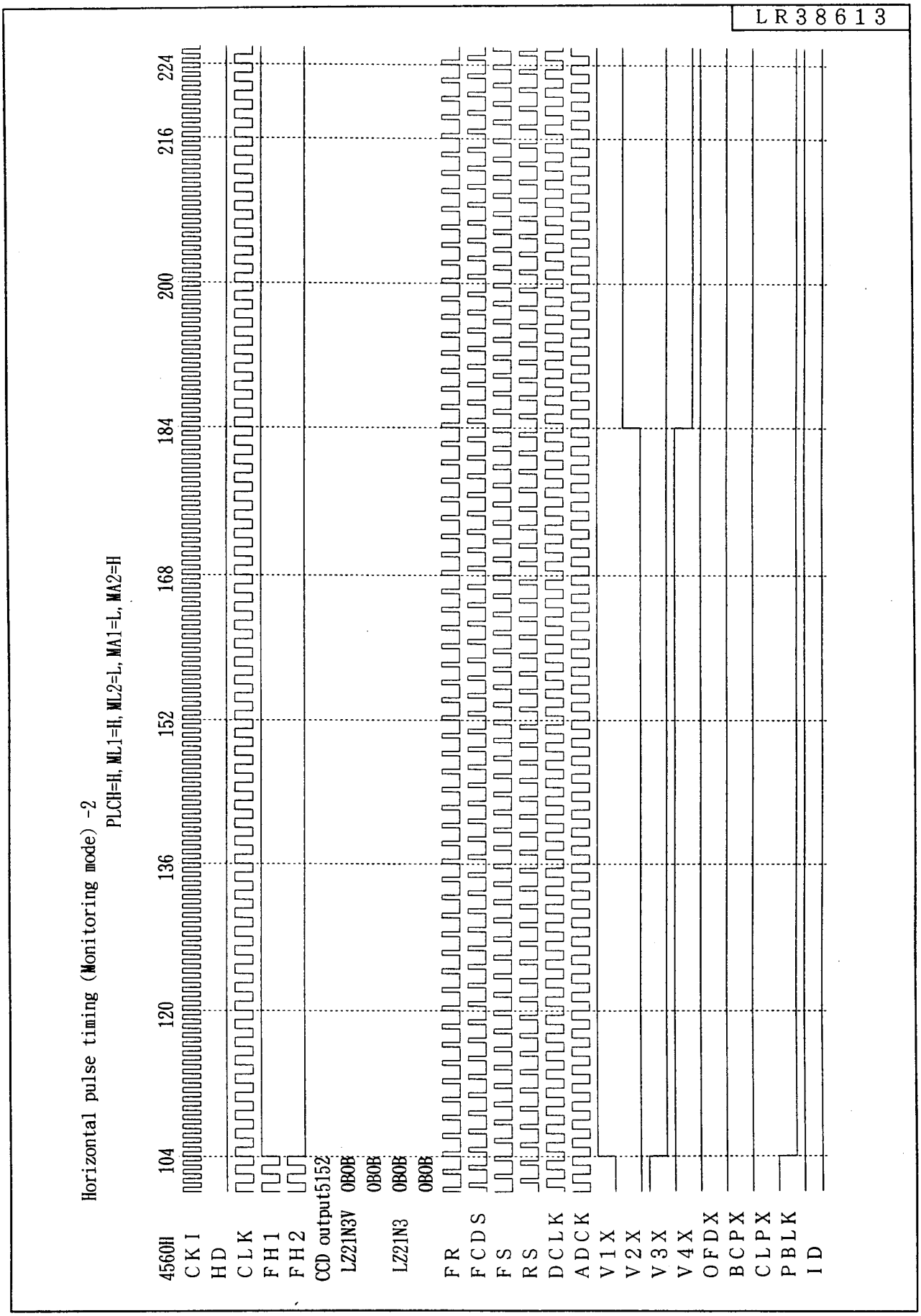
Vertical pulse timing-8

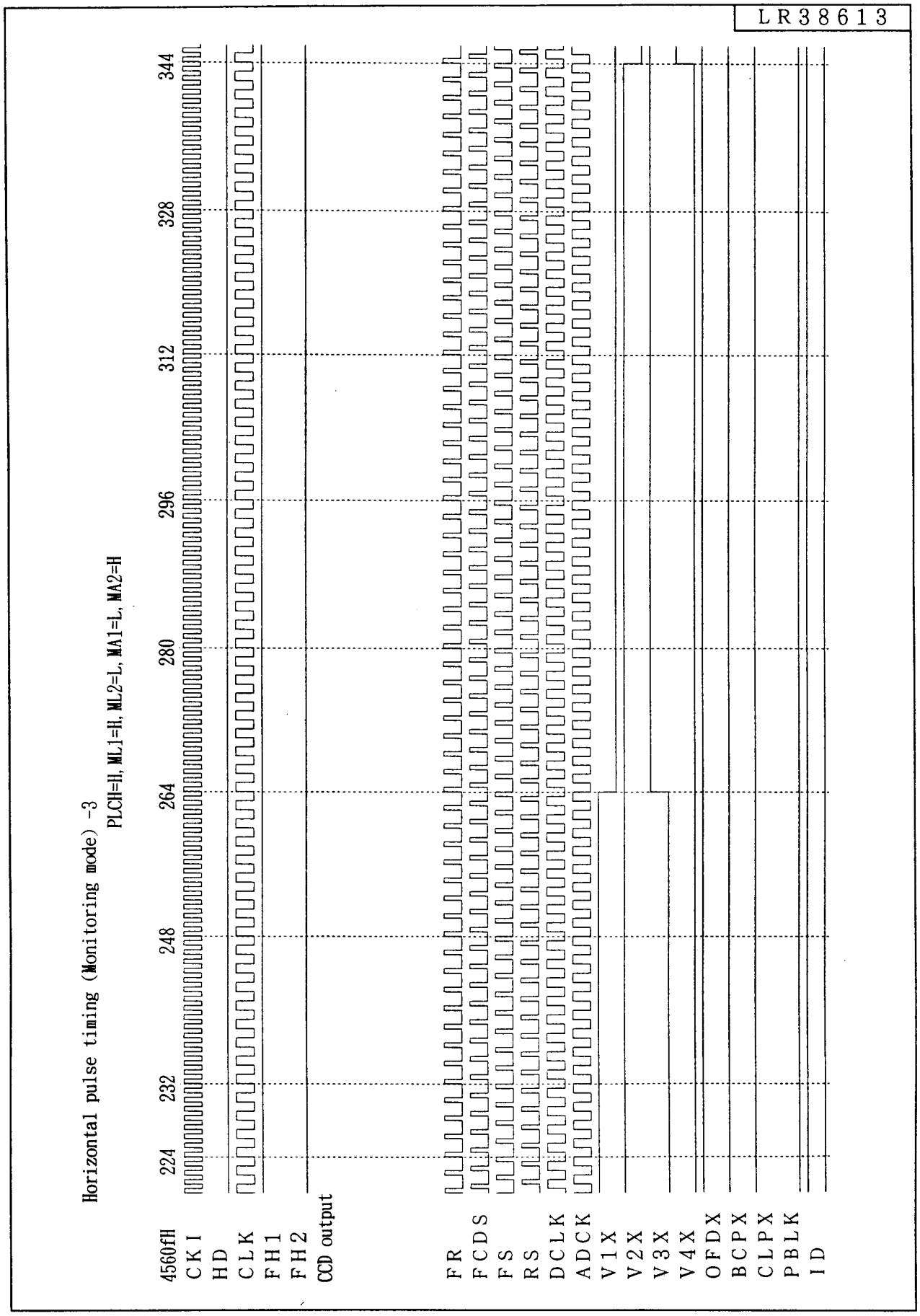


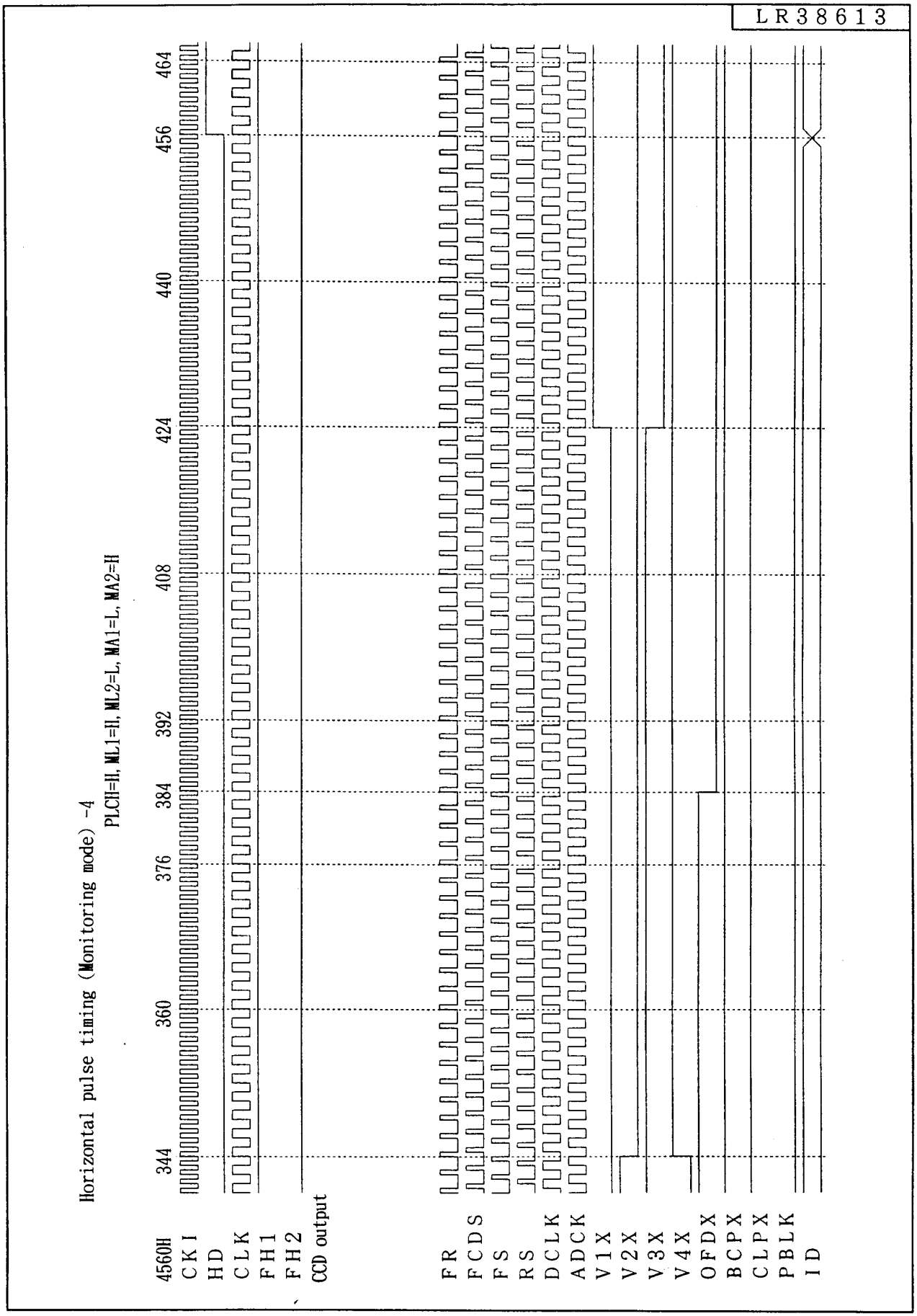
6-3. Horizontal pulse timing

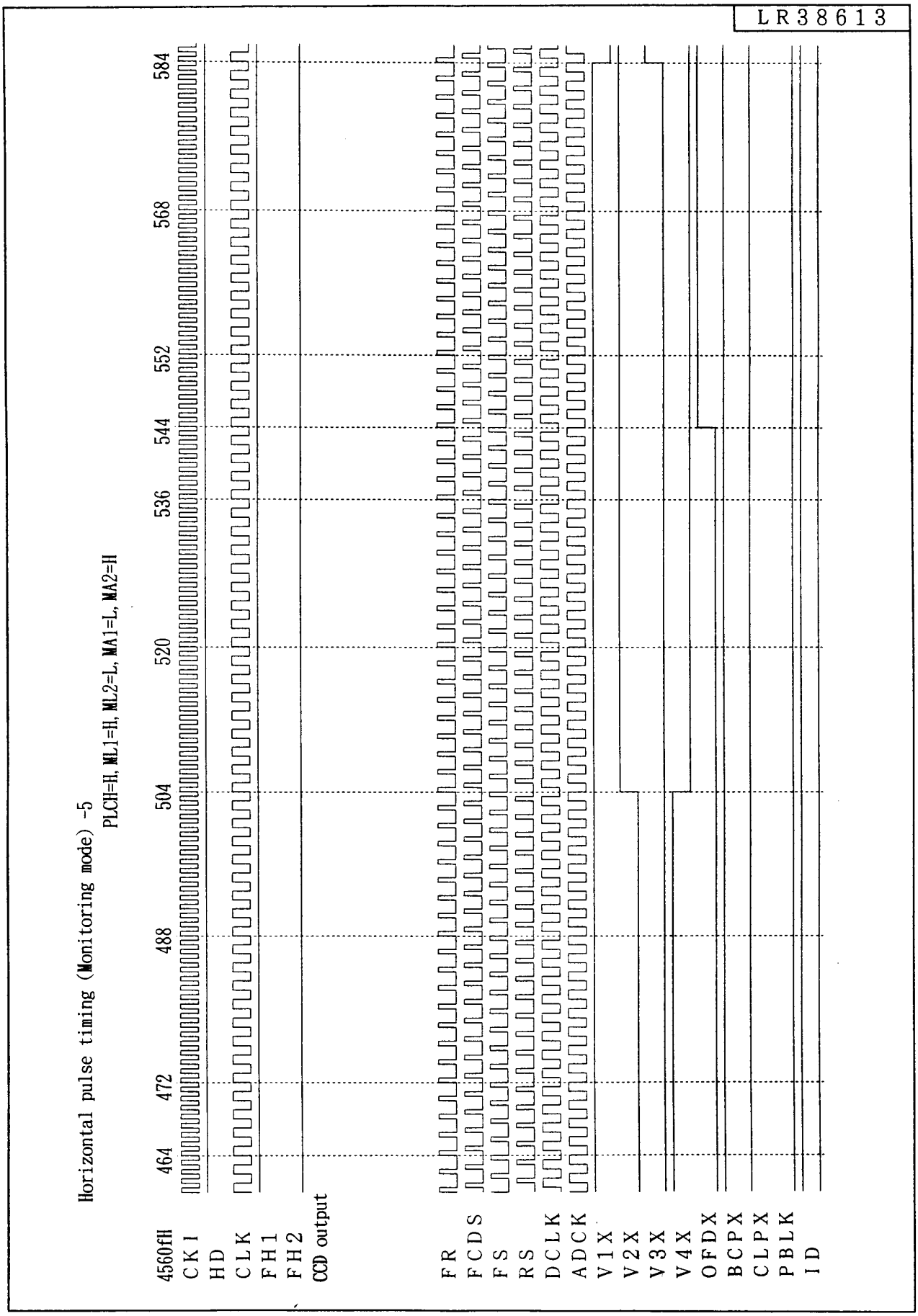
(1) Horizontal pulse timing (Monitoring mode) -1

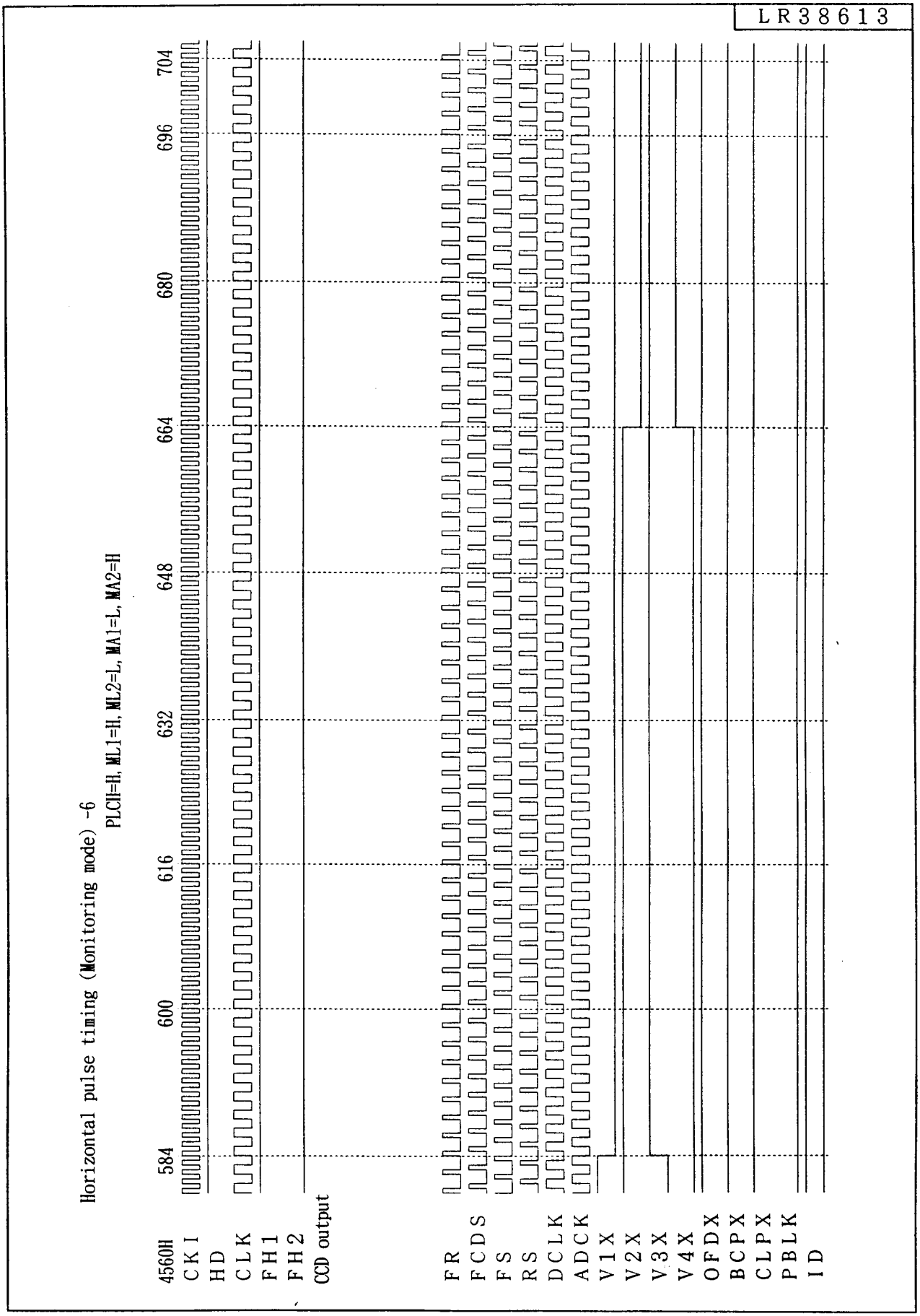


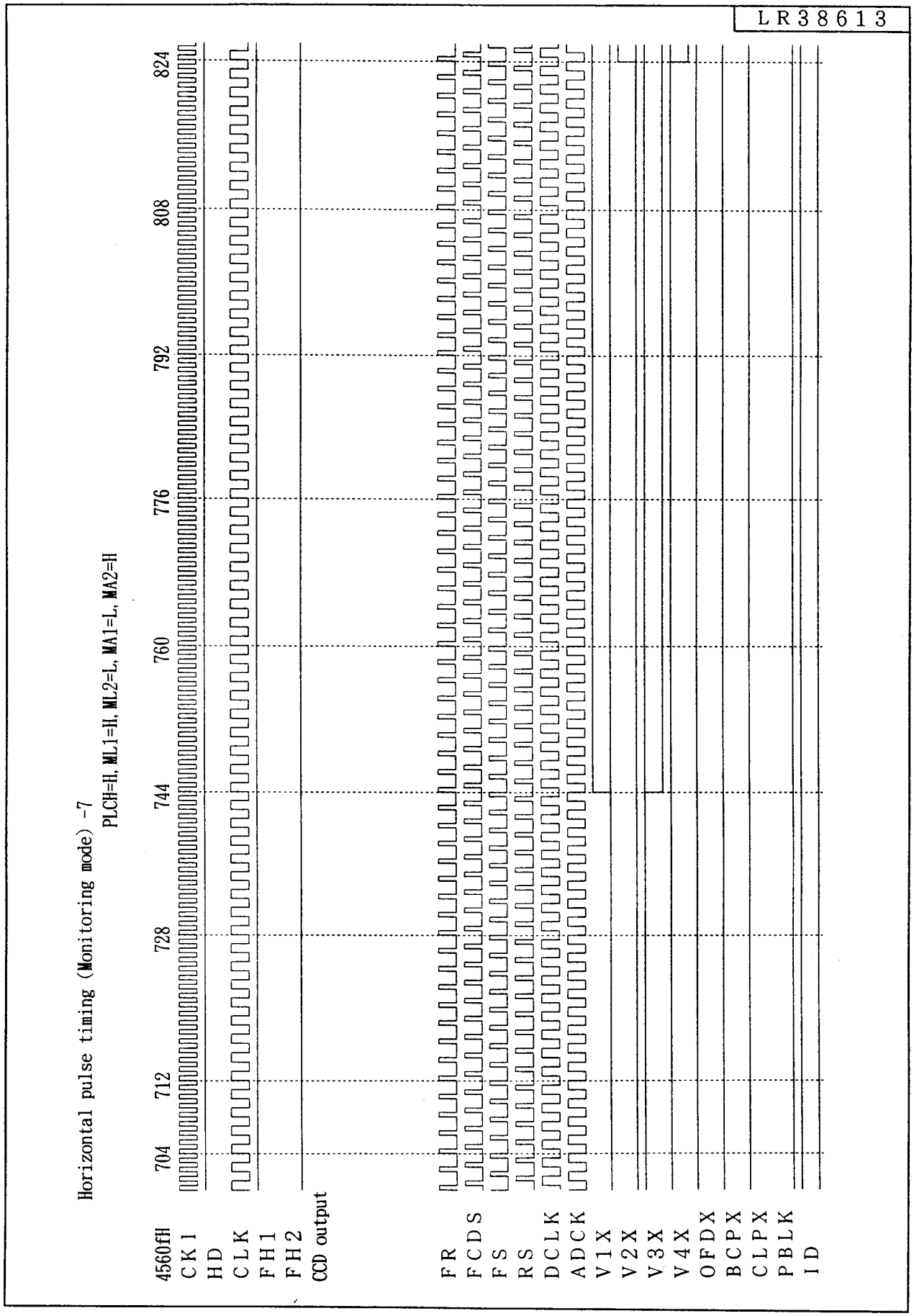

LR38613
Horizontal pulse timing (Monitoring mode) -2
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560H
104
120
136
152
168
184
200
216
224
CKI
HD
CLK
FH1
FH2
CCD output5152
LZ21N3V OBOB
OBOB
LZ21N3 OBOB
OBOB
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID


LR38613
Horizontal pulse timing (Monitoring mode) -3
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560fH
224
232
248
264
280
296
312
328
344
CKI
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID


LR38613
Horizontal pulse timing (Monitoring mode) -4
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560H
344
360
376
384
392
408
424
440
456
464
CKI
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID

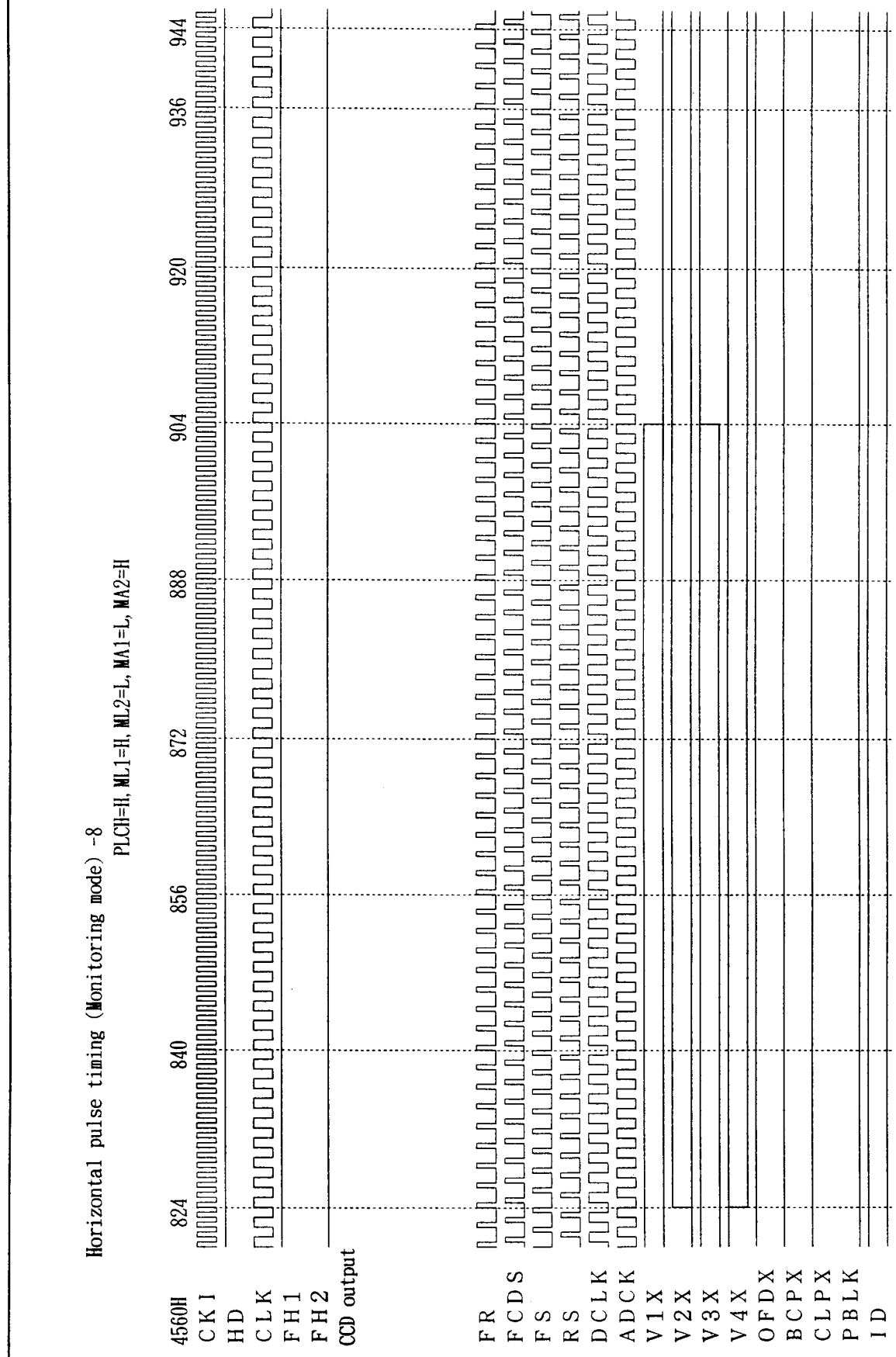

LR38613
Horizontal pulse timing (Monitoring mode) -5
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560fH
464
472
488
504
520
536
544
552
568
584
CK1
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID

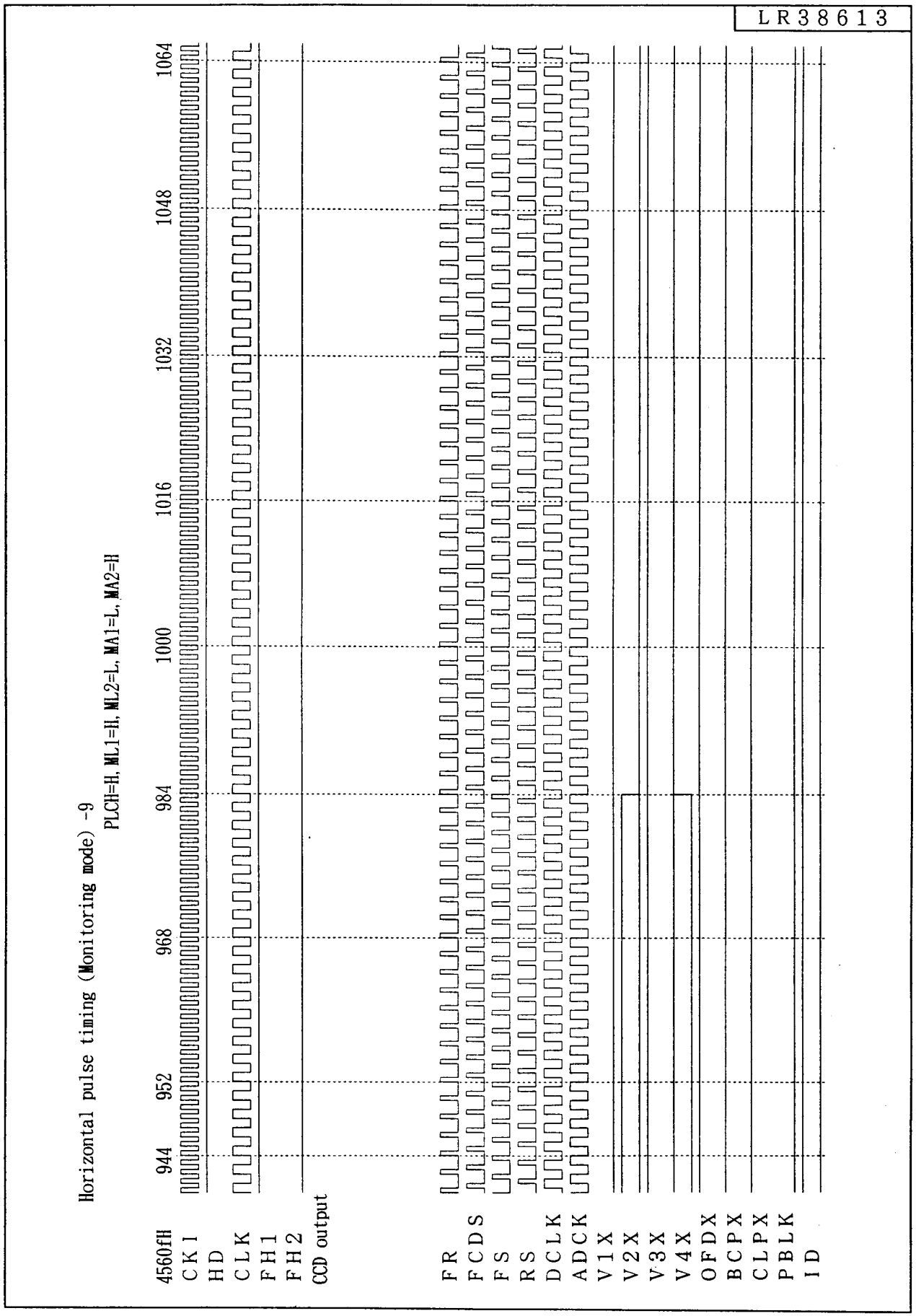

LR38613
Horizontal pulse timing (Monitoring mode) -6
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560H
584
600
616
632
648
664
680
696
704
CKI
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID

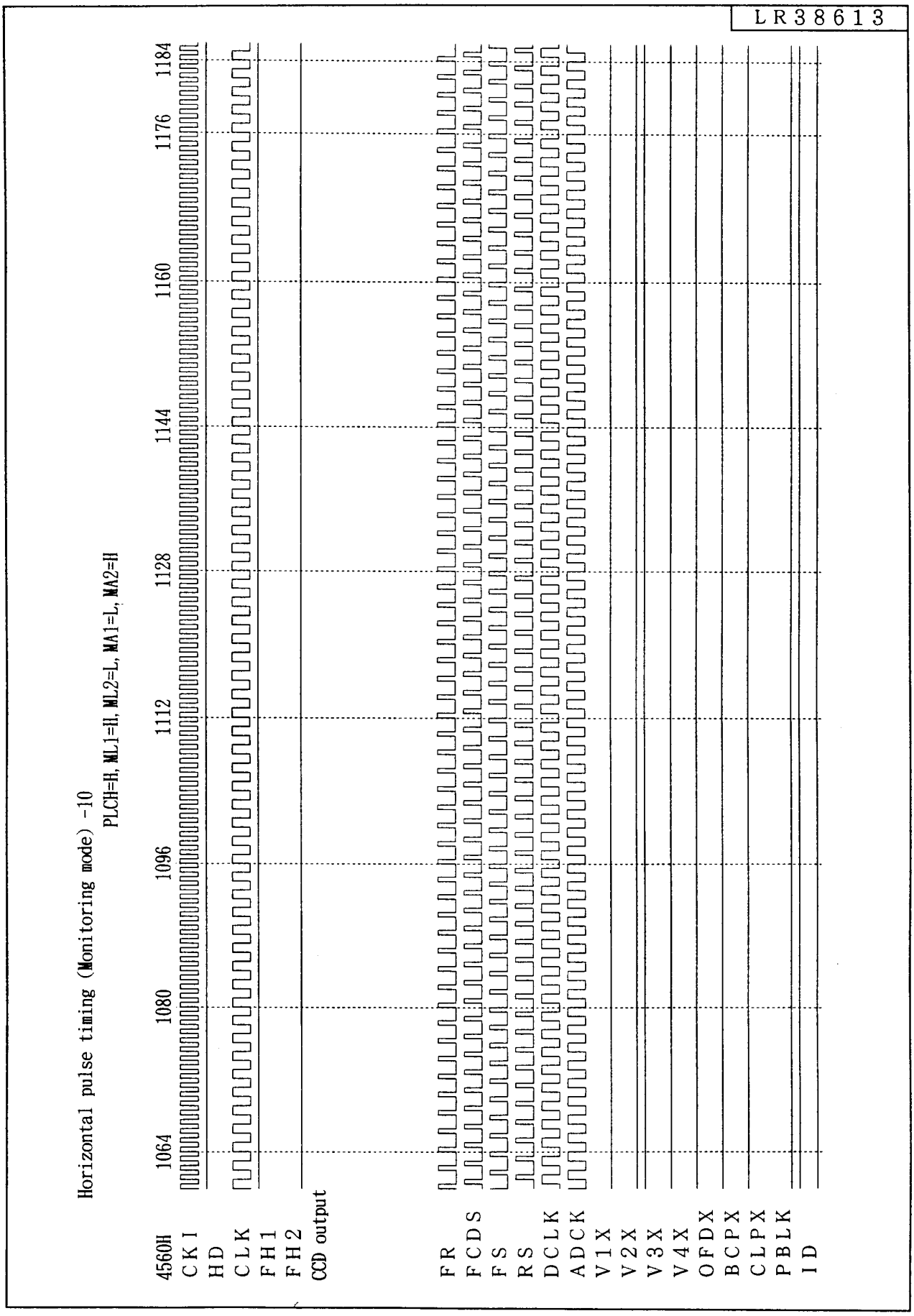

LR38613
Horizontal pulse timing (Monitoring mode) -7
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560fH
704
712
728
744
760
776
792
808
824
CK1
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID

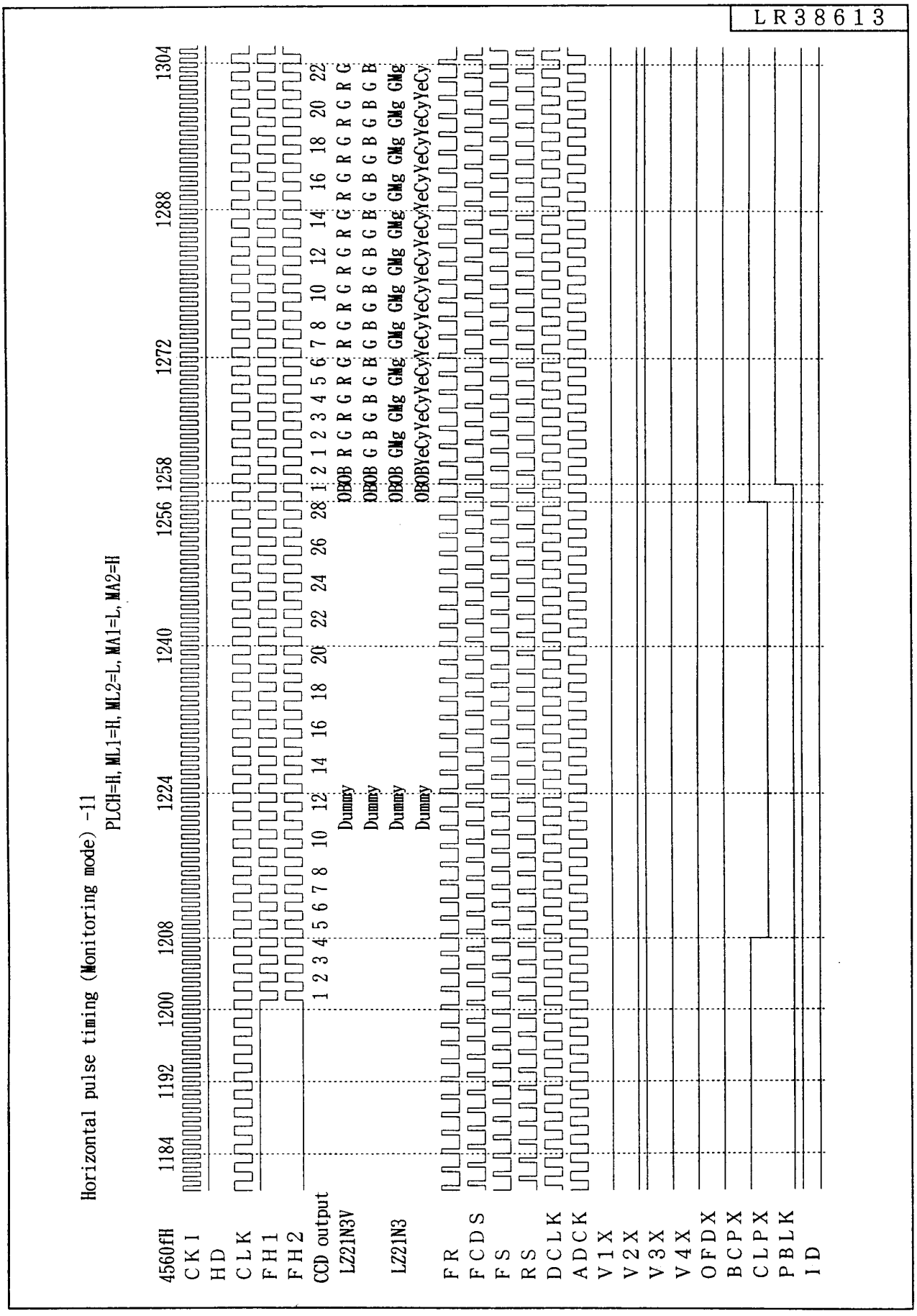
Horizontal pulse timing (Monitoring mode) -8

PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H

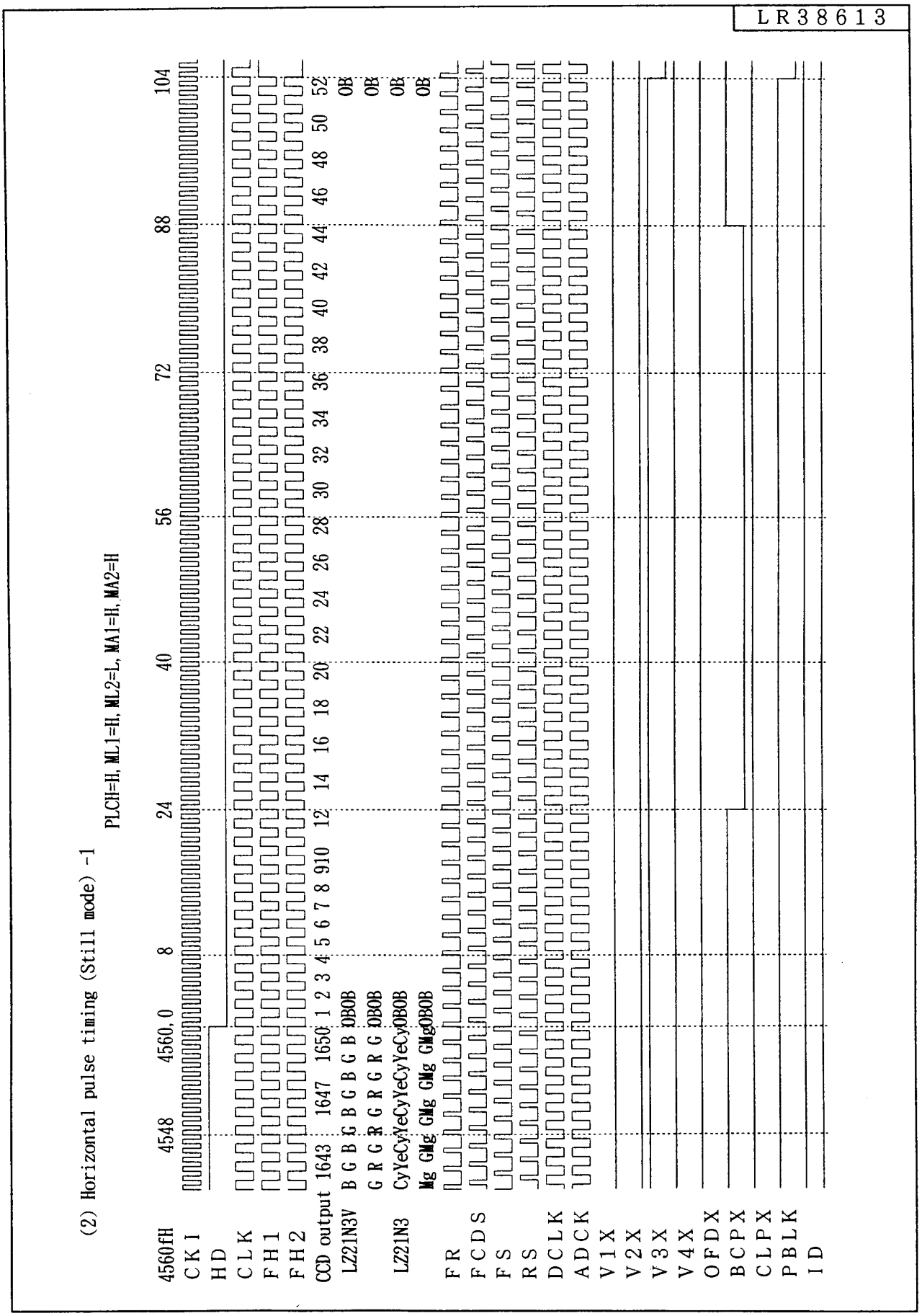


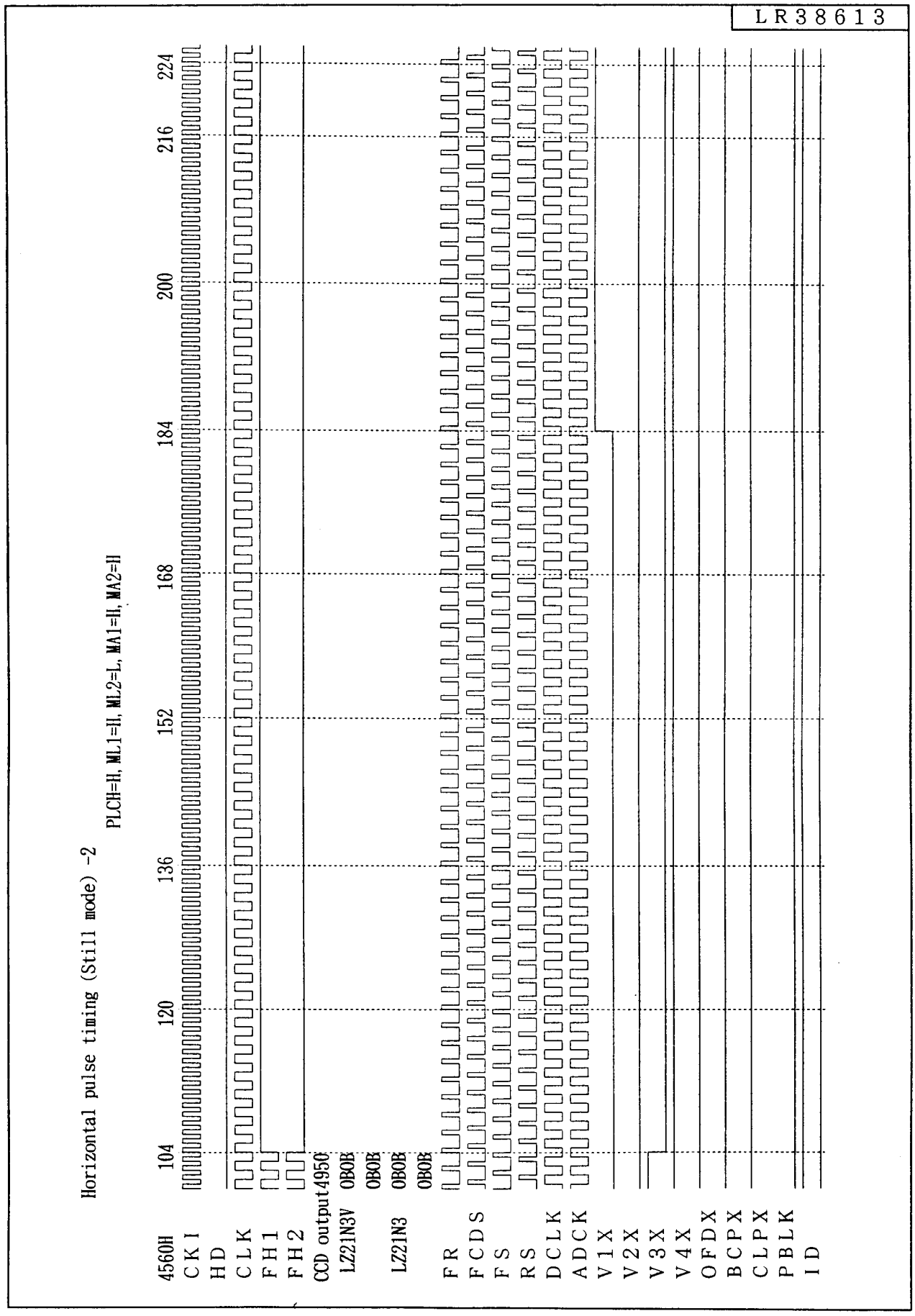

Horizontal pulse timing (Monitoring mode) -9
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560fH
944
952
968
984
1000
1016
1032
1048
1064
CK1
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID


LR38613
Horizontal pulse timing (Monitoring mode) -10
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560H
1064
1080
1096
1112
1128
1144
1160
1176
1184
CKI
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID


LR38613
Horizontal pulse timing (Monitoring mode) -11
PLCH=H, ML1=H, ML2=L, MA1=L, MA2=H
4560fH
CKI
HD
CLK
FH1
FH2
CCD output
LZ21N3V
LZ21N3
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID
1184 1192 1200 1208 1224 1240 1256 1258 1272 1288 1304
Dummy
OBOB R G R G R G R G R G R G R G R G
OBOB G B G B G B G B G B G B G B G B
OBOB GMg GMg GMg GMg GMg GMg GMg GMg
OBOBYeCyYeCyYeCyYeCyYeCyYeCyYeCyYeCy

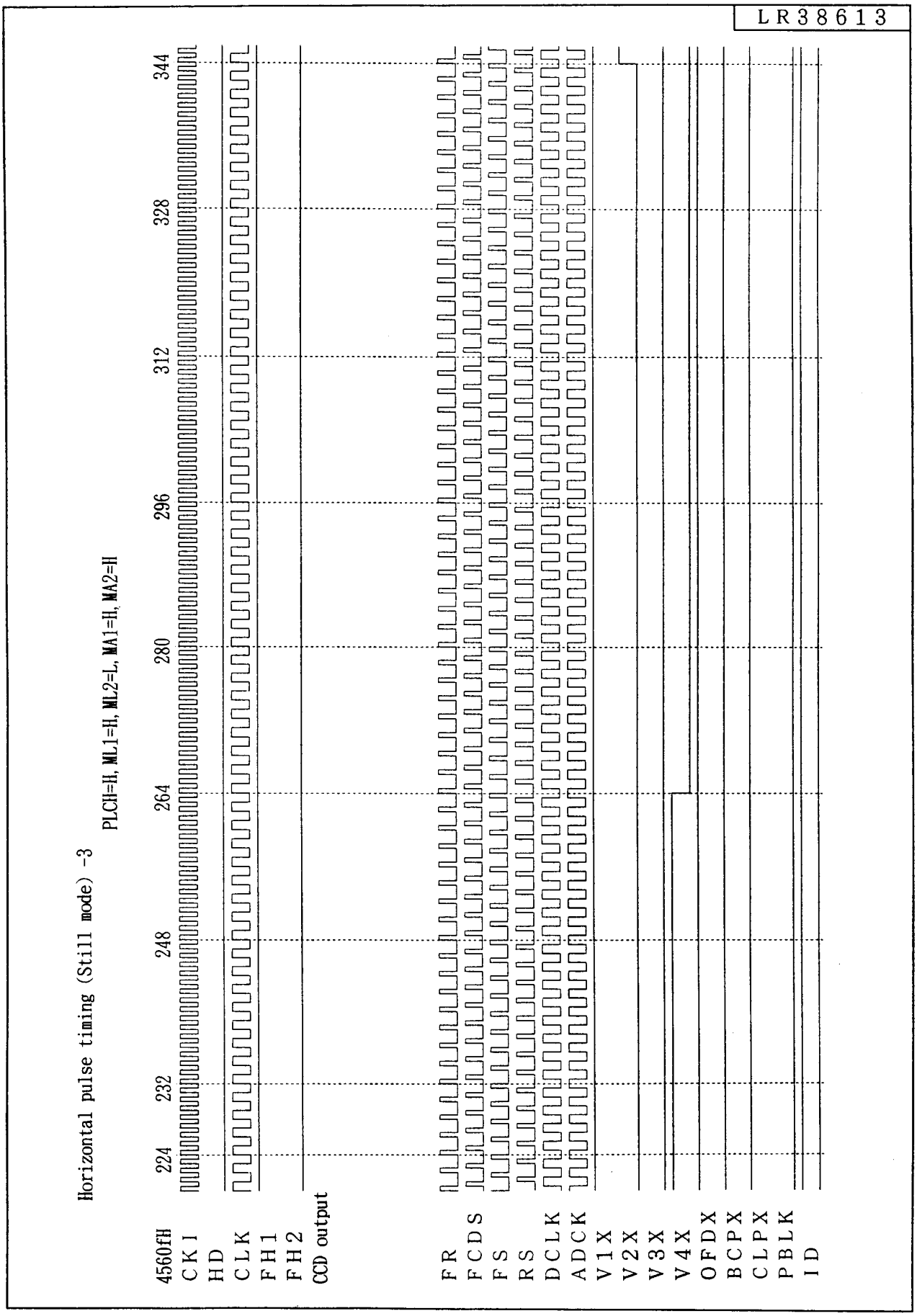
(2) Horizontal pulse timing (Still mode) -1

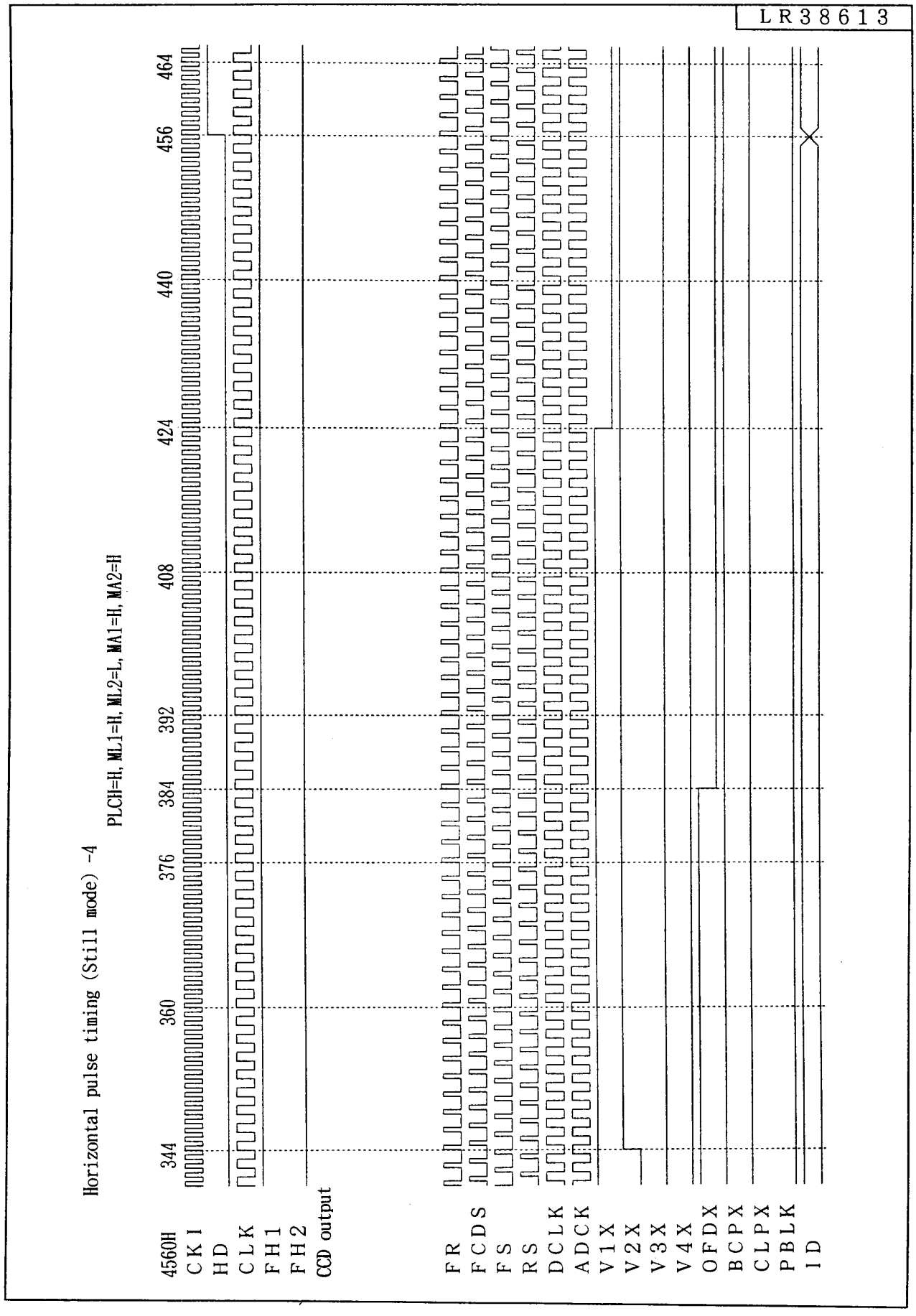


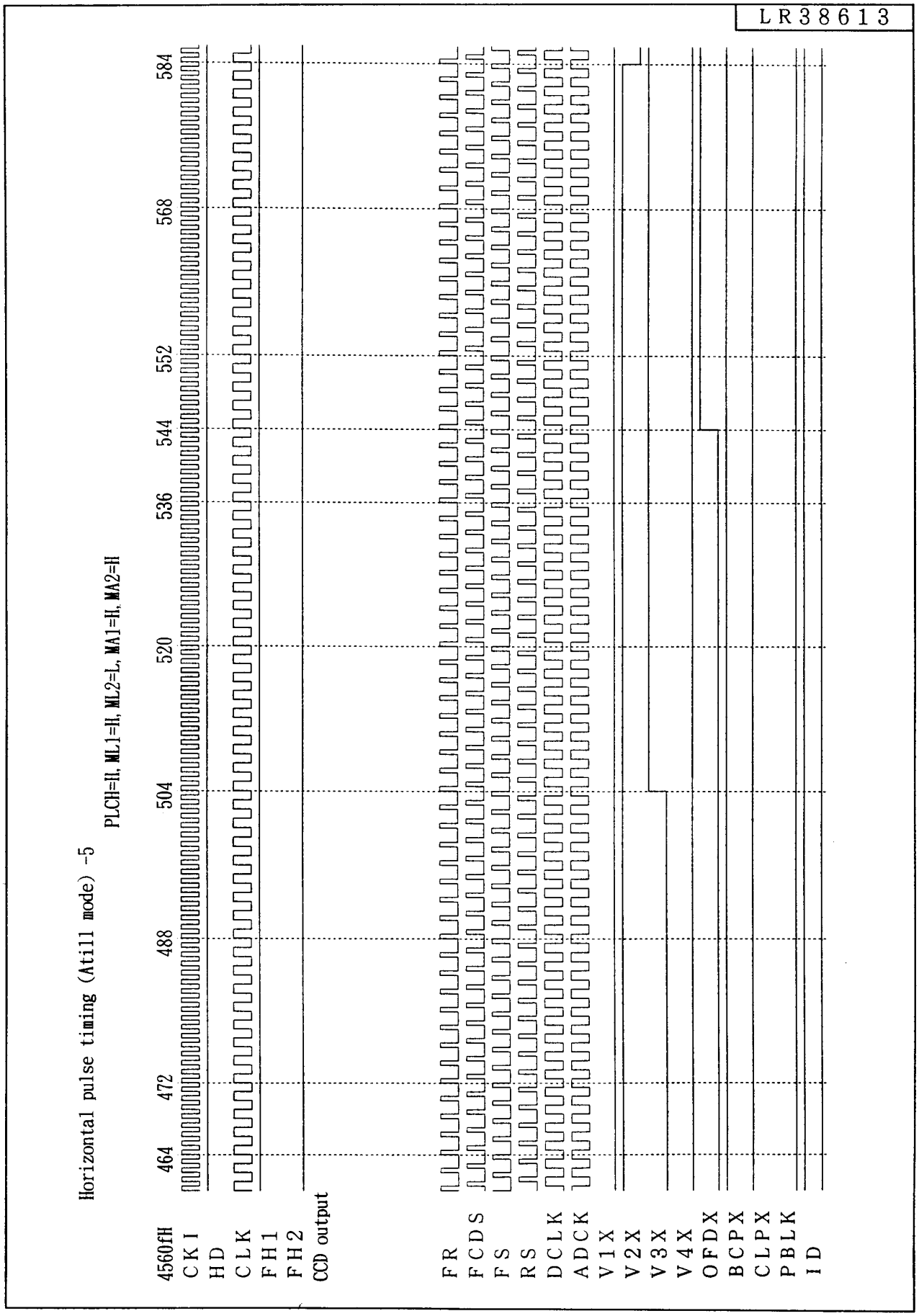

LR38613
Horizontal pulse timing (Still mode) -2
PLCH=H, ML1=H, ML2=L, MA1=H, MA2=H
4560H
104
120
136
152
168
184
200
216
224
CKI
HD
CLK
FH1
FH2
CCD output4950
LZ21N3V
OBOB
OBOB
LZ21N3
OBOB
OBOB
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID

Horizontal pulse timing (Still mode) -3

PLCH=H, ML1=H, ML2=L, MA1=H, MA2=H

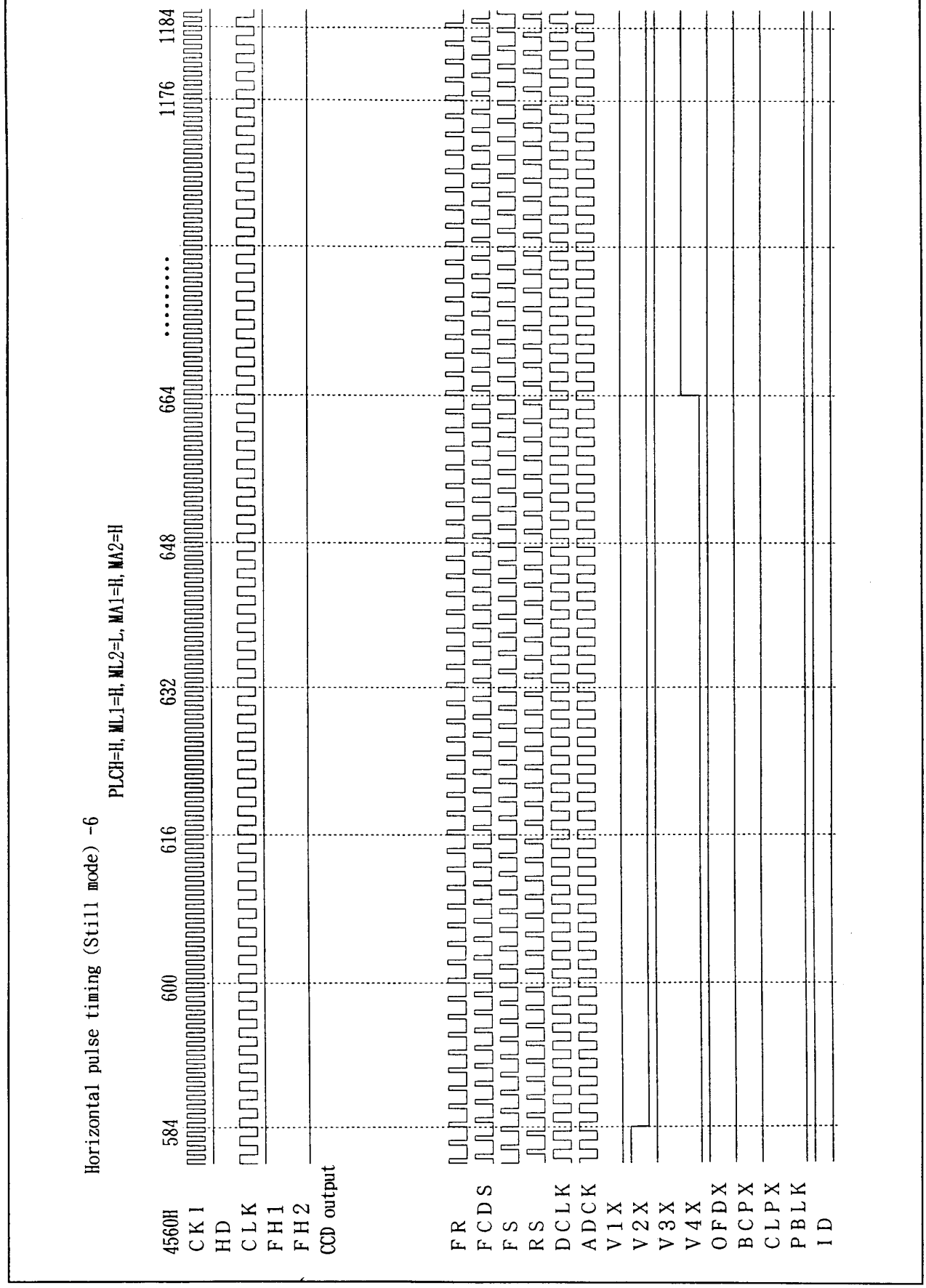



LR38613
Horizontal pulse timing (Still mode) -4
PLCH=H, ML1=H, ML2=L, MA1=H, MA2=H
4560H
344
360
376
384
392
408
424
440
456
464
CKI
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID


LR38613
Horizontal pulse timing (Atill mode) -5
PLCH=H, ML1=H, ML2=L, MA1=H, MA2=H
4560fH
464
472
488
504
520
536
544
552
568
584
CKI
HD
CLK
FH1
FH2
CCD output
FR
FCDS
FS
RS
DCLK
ADCK
V1X
V2X
V3X
V4X
OFDX
BCPX
CLPX
PBLK
ID

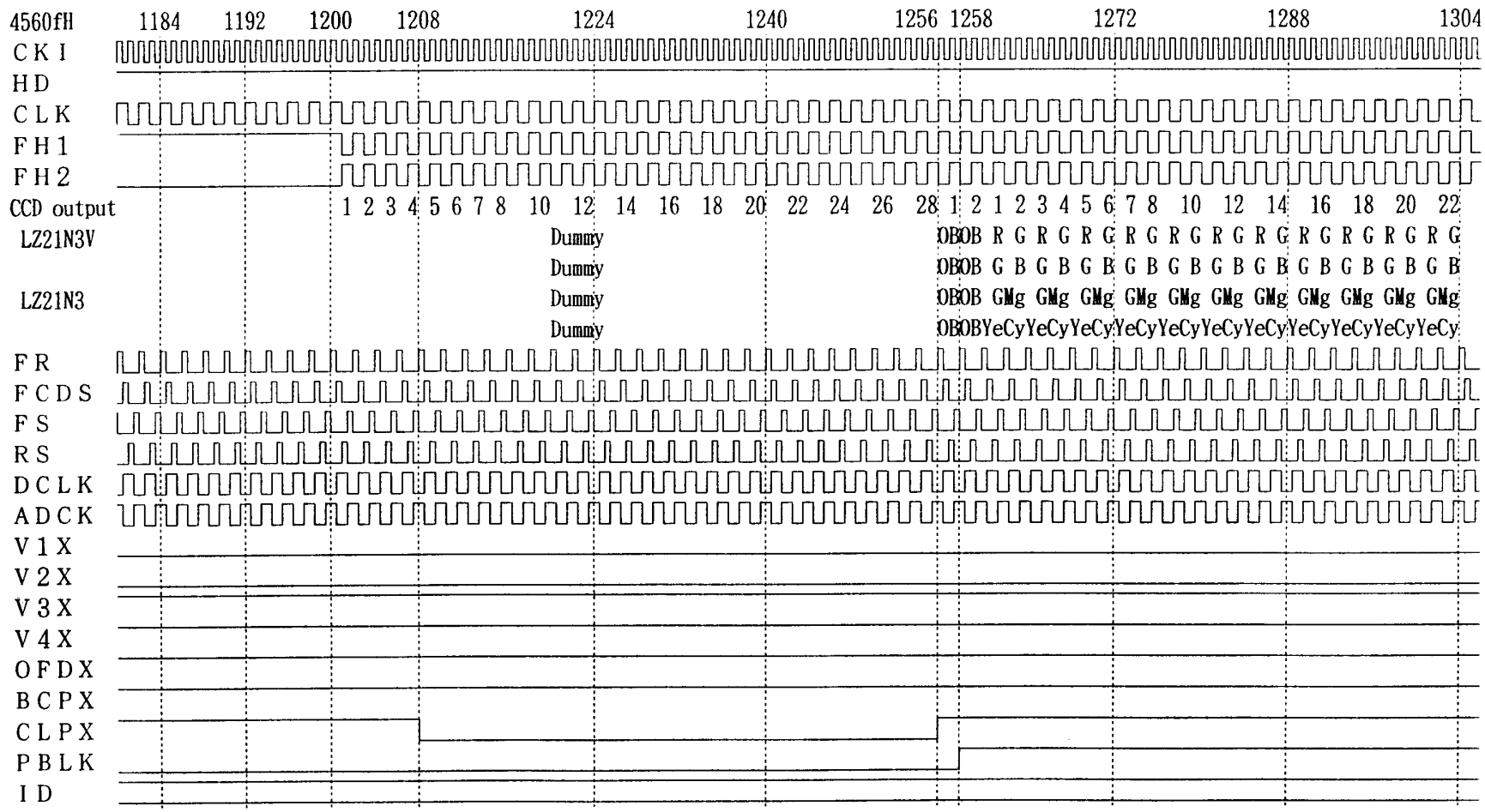
Horizontal pulse timing (Still mode) -6

PLCH=H, ML1=H, ML2=L, MA1=H, MA2=H

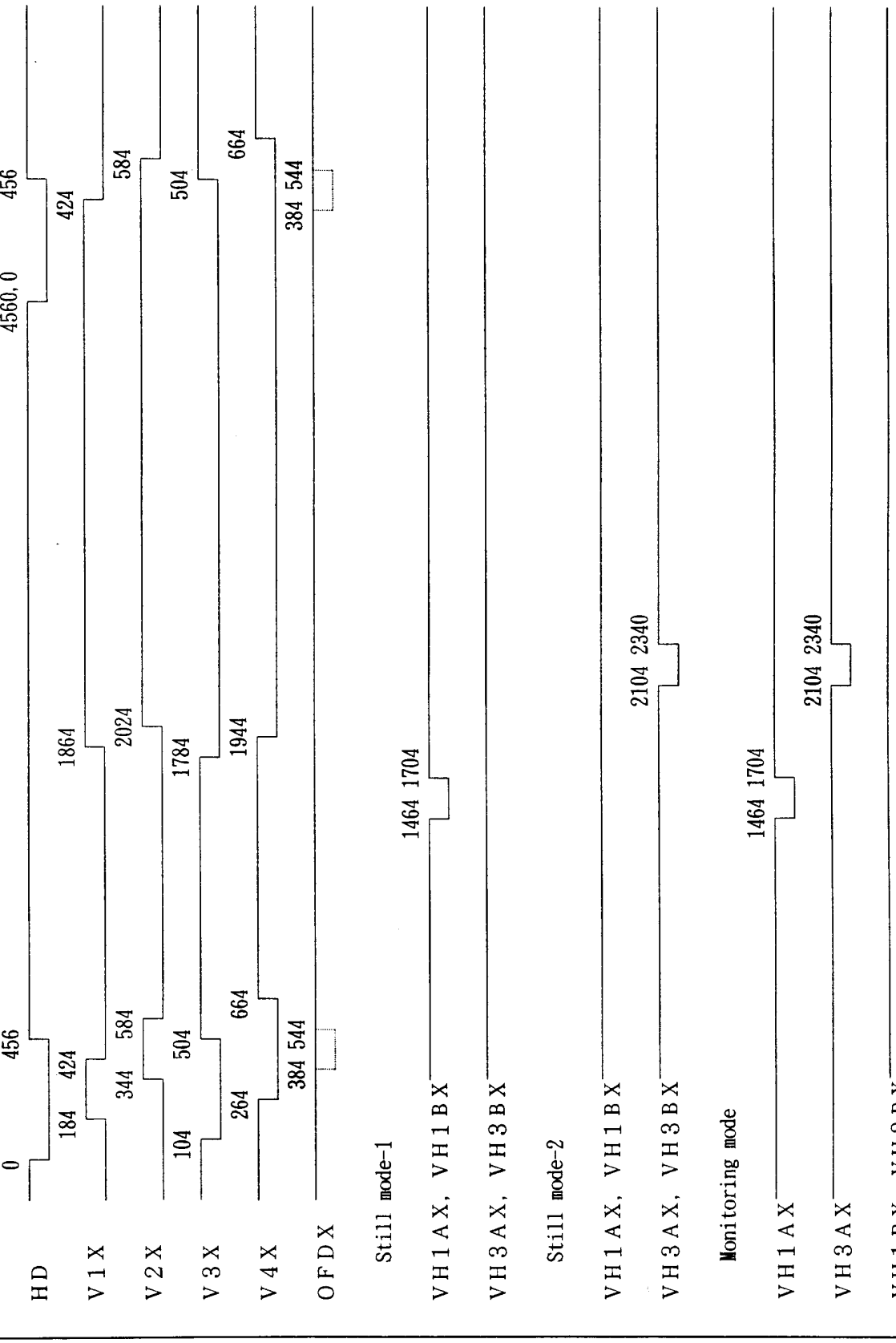


Horizontal pulse timing (Still mode) -7

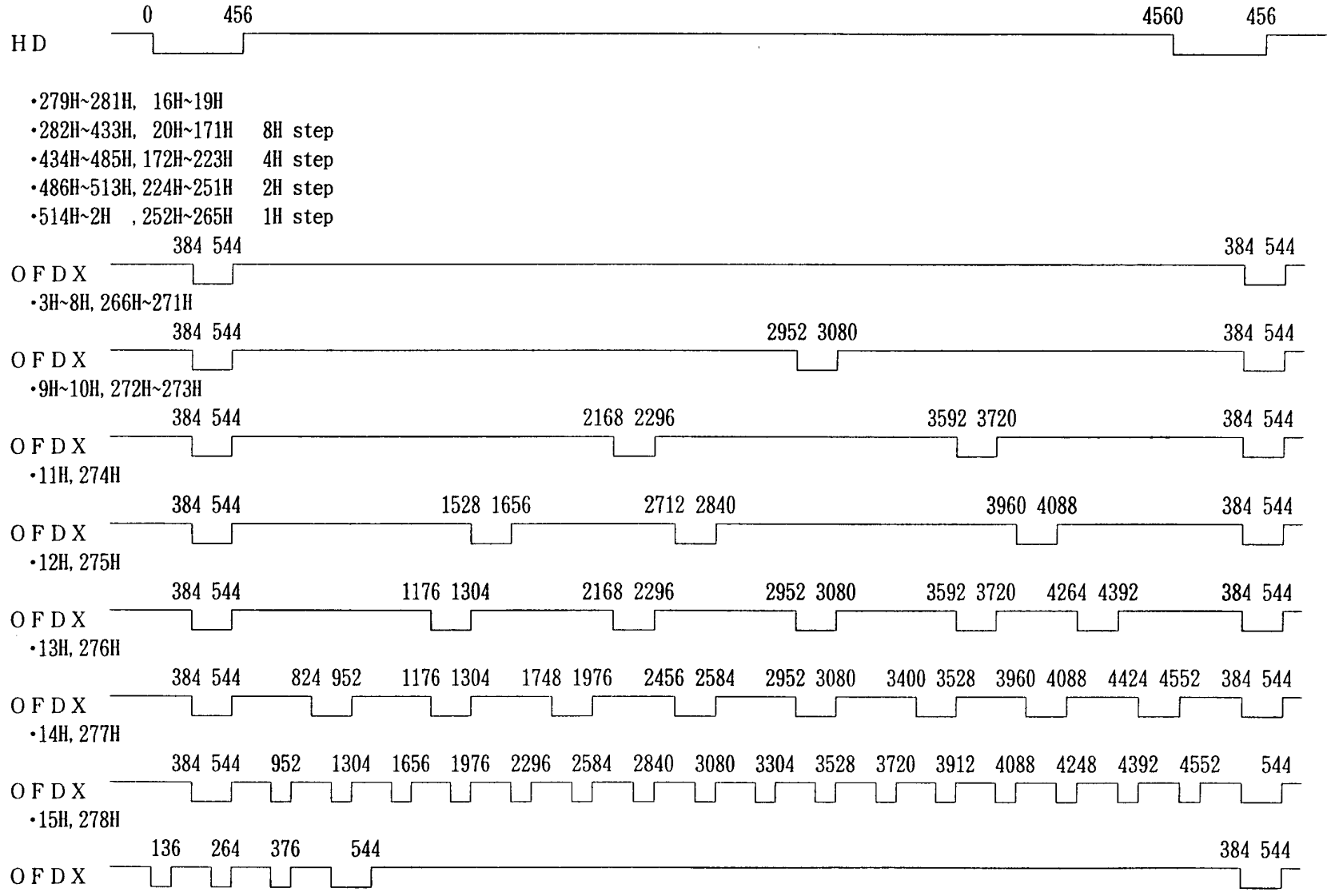
PLCH=H, ML1=H, ML2=L, MA1=H, MA2=H



6-4. Read-out pulse timing

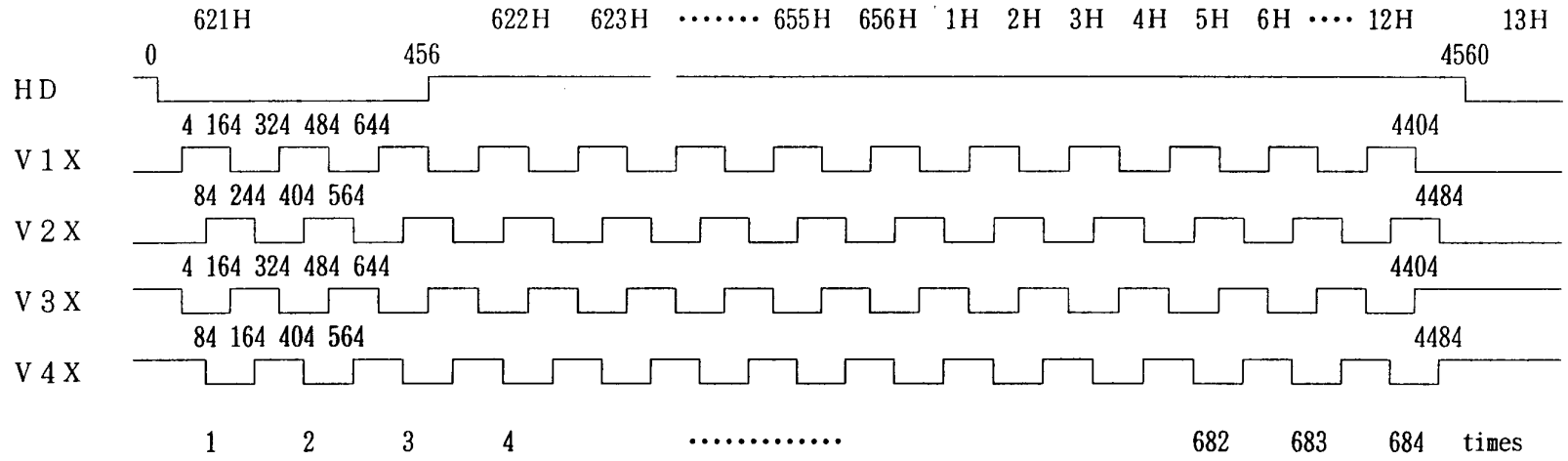


6-5. Electronic shutter pulse timing

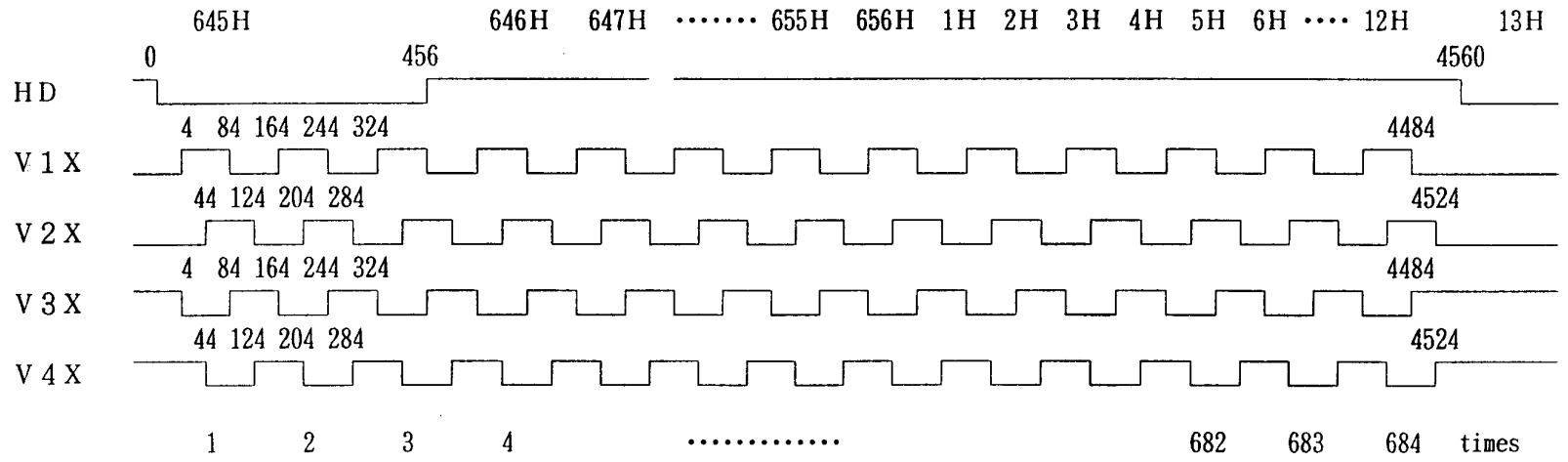


6-6. Sweep-out pulse timing

1st field of still picture

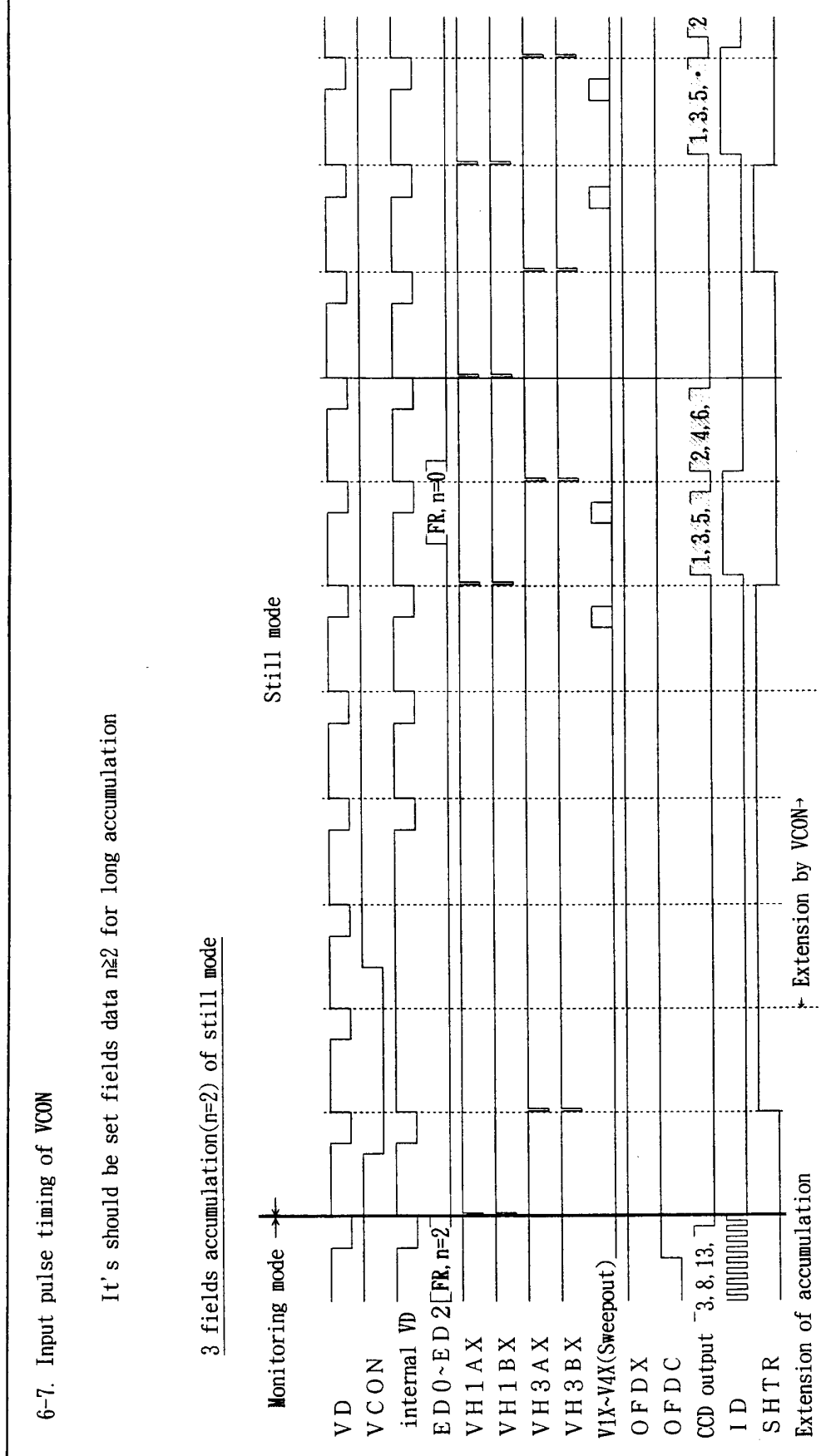


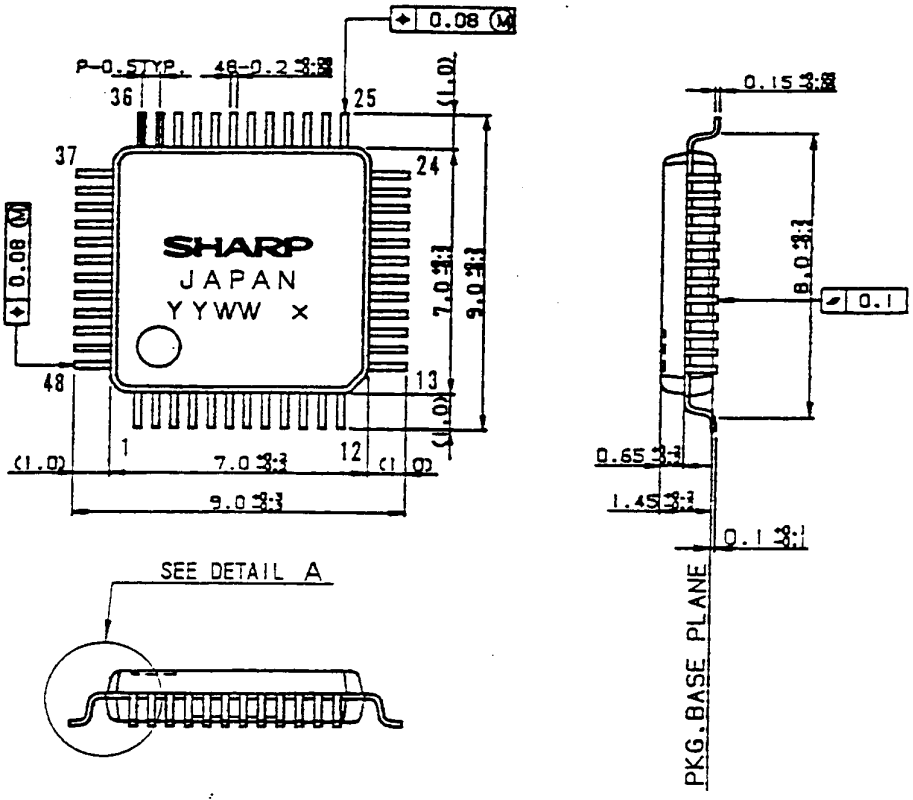
2nd First field of still picture

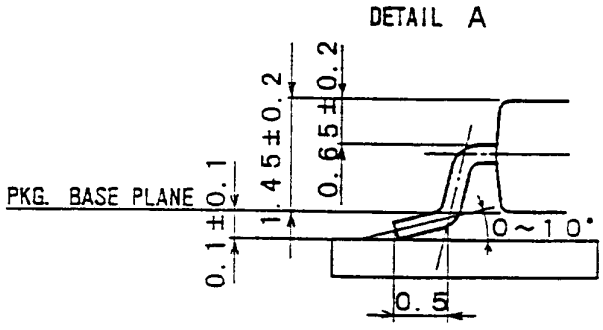


6-7. Input pulse timing of VCON

It's should be set fields data n≥2 for long accumulation







名称 NAME	QFP48-P-0707	リード仕上 LEAD FINISH	TIN-LEAD PLATING	備考 NOTE	プラスチックパッケージ外形寸法は、バリを含まないものとする。 Plastic body dimensions do not include burr of resin.
DRAWING NO.	AA1035	単位 UNIT	mm		

Timing IC for 2.0M CCD, LR38613