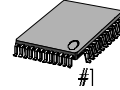


GENERAL DESCRIPTION

KS7214 is Timing control IC for generating timing signal & sync signal which required camera system using monochrome CCD Image sensor.

48 - QFP - 0707



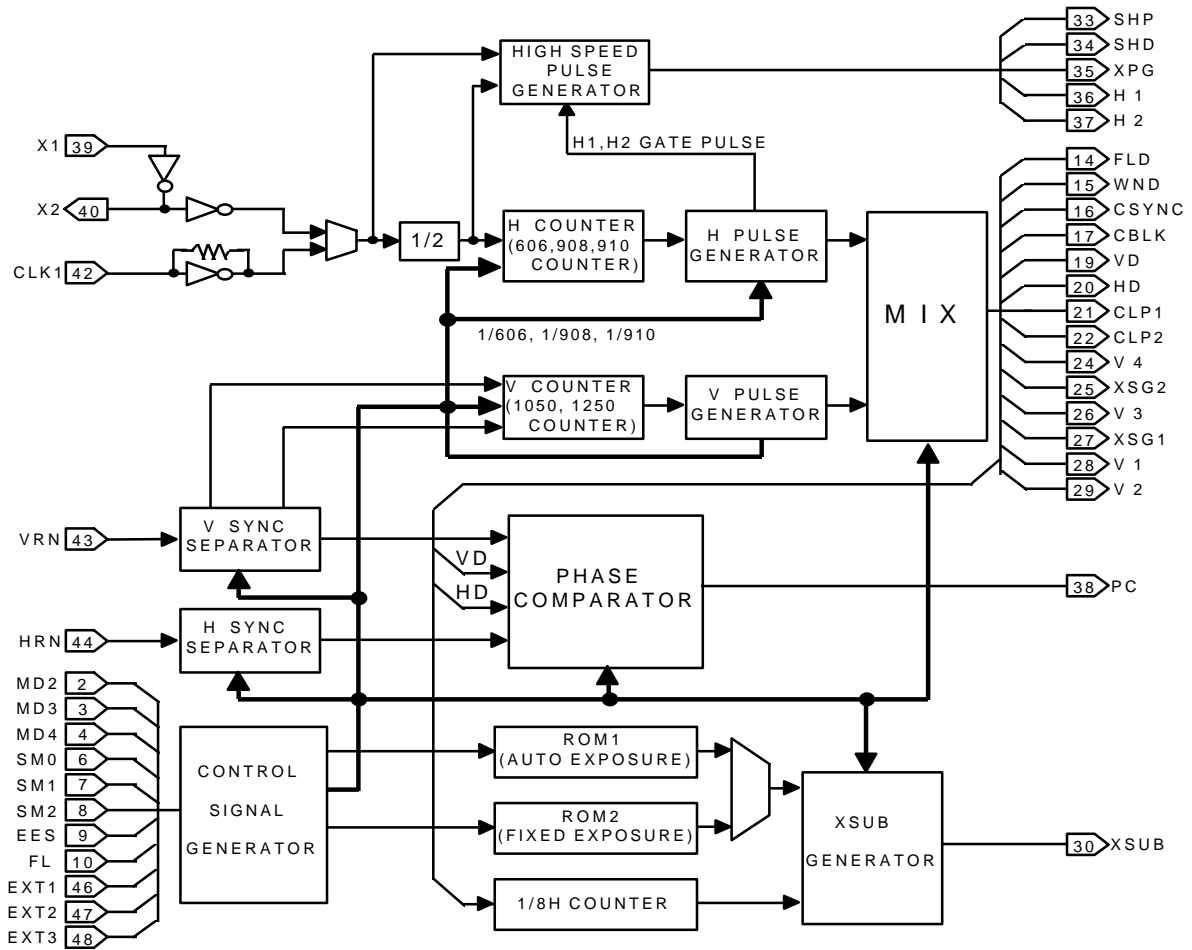
FUNCTIONS

- EIA/CCIR STANDARDS TIMING MODE
- HI-BAND/NORMAL TIMING MODE
- FRAME/FIELD ACCUMULATION MODE
- INTERLACE/NON-INTERLACE MODE
- EXTERNAL SYNCHRONIZATION MODE
- ELECTRONIC IRIS (ELECTRONIC SHUTTER)
- SYNC SIGNAL GENERATION
- OSCILLATION FREQUENCY :
 - EIA NORMAL MODE : 19.06992 MHz
 - CCIR NORMAL MODE : 18.93750 MHz
 - EIA HI-BAND MODE : 28.63636 MHz
 - CCIR HI-BAND MODE : 28.37500 MHz

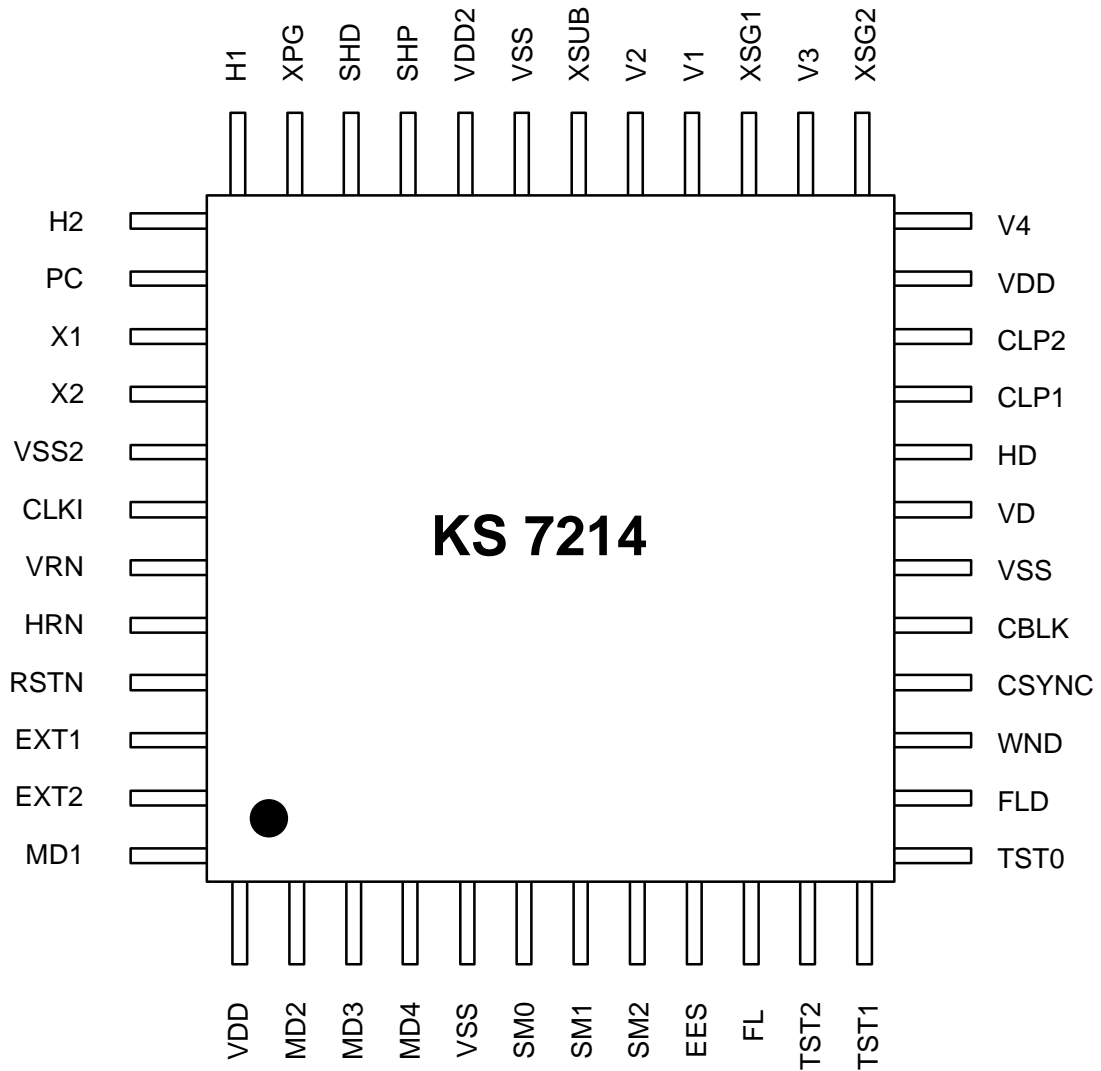
ORDERING INFORMATION

| Device | Package | Operating Temperature |
|--------|-------------|-----------------------|
| KS7214 | 48-QFP-0707 | - 20°C ~ +75 °C |

BLOCK DIAGRAM



PIN CONFIGURATION



PIN DESCRIPTION

| Pin No. | Pin Name | I/O | Pin Description |
|---------|----------|-----|--|
| 1 | VDD | - | Power Supply |
| 2 | MD2 | I | Mode Switching; HI-Band: High, Normal: Low (with Pull-down) |
| 3 | MD3 | I | Mode Switching; Non - Interlace: High, Interlace: Low (with Pull-down) |
| 4 | MD4 | I | Mode Switching; Frame : High, Field: Low (with Pull-down) |
| 5 | VSS | - | Ground |
| 6 | SM0 | I | Shutter Speed Control (with Pull-down) |
| 7 | SM1 | I | Shutter Speed Control (with Pull-down) |
| 8 | SM2 | I | Shutter Speed Control (with Pull-down) |
| 9 | EES | I | Electronic Shutter Mode; Auto Mode: High, Fixed Mode: Low (with Pull-down) |
| 10 | FL | I | Flickerless Shutter Mode; Flickerless Mode: High (with Pull-down) |
| 11 | TST2 | I | Test Mode Select 2 (with Pull-down) |
| 12 | TST1 | I | Test Mode Select 1 (with Pull-down) |
| 13 | TST0 | I | Test Mode Select 0 (with Pull-down) |
| 14 | FLD | O | Field Separation Pulse |
| 15 | WND | O | Window Pulse |
| 16 | CSYNC | O | Composite Sync Pulse |
| 17 | CBLK | O | Composite Blank Pulse |
| 18 | VSS | - | Ground |
| 19 | VD | O | Vertical Drive Pulse |
| 20 | HD | O | Horizontal Drive Pulse |
| 21 | CLP1 | O | Clamp Pulse 1 |
| 22 | CLP2 | O | Clamp Pulse 2 |
| 23 | VDD | - | Power Supply |
| 24 | V4 | O | CCD Vertical Register Drive Pulse 4 |

PIN DESCRIPTION (Continued)

| Pin No. | Pin Name | I/O | Pin Description |
|---------|----------|-----|---|
| 25 | XSG2 | O | CCD Sensor Read Out Pulse 2 |
| 26 | V3 | O | CCD Vertical Register Drive Pulse 3 |
| 27 | XSG1 | O | CCD Sensor Read Out Pulse 1 |
| 28 | V1 | O | CCD Vertical Register Drive Pulse 1 |
| 29 | V2 | O | CCD Vertical Register Drive Pulse 2 |
| 30 | XSUB | O | CCD Discharge Pulse |
| 31 | VSS | - | Ground |
| 32 | VDD2 | - | Power Supply 2 |
| 33 | SHP | O | Precharge Sample & Hold Pulse |
| 34 | SHD | O | Data Sample & Hold Pulse |
| 35 | XPG | O | CCD Reset Gate Pulse |
| 36 | H1 | O | CCD Horizontal Register Drive Pulse |
| 37 | H2 | O | CCD Horizontal Register Drive Pulse |
| 38 | PC | O | Phase Comparator Output |
| 39 | X1 | I | Oscillator Input |
| 40 | X2 | O | Oscillator Output |
| 41 | VSS2 | - | Ground 2 |
| 42 | CLKI | I | Clock Input For EXT. Sync Mode |
| 43 | VRN | I | Vertical PLL Reference For External Sync Mode (Schmitt Pull-up) |
| 44 | HRN | I | Horizontal PLL Reference For External Sync Mode (Schmitt Pull-up) |
| 45 | RSTN | I | System Initialization Pulse (Schmitt Pull-up) |
| 46 | EXT1 | I | External Sync Mode Select (with Pull-down) |
| 47 | EXT2 | I | External Sync Mode Select (with Pull-down) |
| 48 | MD1 | I | Mode Switching; CCIR: High, EIA: Low (with Pull-down) |

ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)

| PARAMETER | SYMBOL | CONDITION | UNIT |
|------------------|------------------|-----------------------|------|
| SUPPLY VOLTAGE | VDD | VSS - 0.3 ~ + 7.0 | V |
| INPUT VOLTAGE | VI | VSS - 0.3 ~ VDD + 0.3 | V |
| OUTPUT VOLTAGE | VO | VSS - 0.3 ~ VDD + 0.3 | V |
| OPERATING TEMP. | T _{opr} | 0 ~ + 70 | °C |
| STORAGE TEMP. | T _{str} | - 40 ~ + 125 | °C |
| LATCH-UP CURRENT | I _{LU} | 100 | mA |

DC CHARACTERISTICS (Ta = 25 °C)

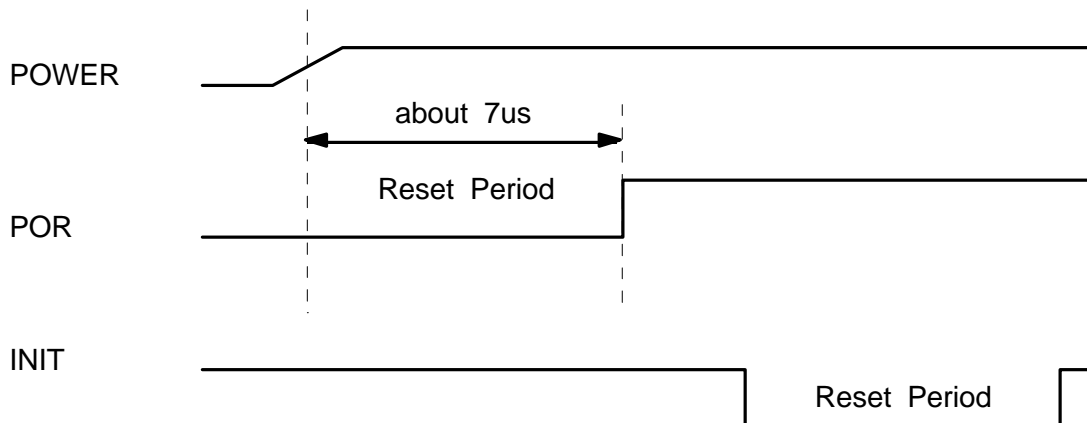
| Item | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|------------------|----------------------------|--------|------|--------|------|
| Supply voltage | VDD | - | 4.75 | 5.00 | 5.25 | V |
| Input voltage1 (Normal input) | VIH 1 | CMOS Level Interface | 0.7VDD | - | - | V |
| | VIL 1 | CMOS Level Interface | - | - | 0.3VDD | V |
| Input voltage2 (Pin 43, 44, 45) | VIH2 | CMOS Level schmitt trigger | 0.8VDD | - | - | V |
| | VIL2 | CMOS Level schmitt trigger | - | - | 0.2VDD | V |
| Input Current 1(With pull-down) | I _{IH1} | VI = VDD | 50 | - | 200 | uA |
| | I _{IL1} | VI = VSS | -10 | - | 10 | uA |
| Input Current 2 (With pull-up: Pin 43, 44, 45) | I _{IH2} | VI = VDD | -10 | - | 10 | uA |
| | I _{IL2} | VI = VSS | -200 | - | -50 | uA |
| Input Current 3 (Normal Input: Pin 42) | I _{IH3} | VI = VDD | -40 | - | 40 | uA |
| | I _{IL3} | VI = VSS | -40 | - | 40 | uA |
| Output voltage 1(Normal output) | VOH1 | IOH = -2mA | 2.4 | - | - | V |
| | VOL1 | IOL = 2mA | - | - | 0.4 | V |
| Output voltage 2 (Pin 33, 34, 35) | VOH2 | IOH = -4mA | 2.4 | - | - | V |
| | VOL2 | IOL = 4mA | - | - | 0.4 | V |
| Output voltage 3 (Pin 36, 37) | VOH3 | IOH = -16mA | 2.4 | - | - | V |
| | VOL3 | IOL = 16mA | - | - | 0.4 | V |
| Output voltage 4 (Pin 40) | VOH4 | IOH = -1mA | 2.4 | - | - | V |
| | VOL4 | IOL = 1mA | - | - | 0.4 | V |
| Operating current | IDD | VDD = 5.25V | - | 25 | 50 | mA |
| Static current | I _{ST} | VDD = 5.25V | - | 420 | - | uA |

OPERATION EXPLANATION

INTERNAL RESET OPERATION

* Including power on reset. (Typ. 7us)

* Rstn low active reset at the internal mode



EXTERNAL SYNCHRONIZATION OPERATION

| EXT 1 | EXT 2 | MODE |
|-------|-------|-------------------------------|
| 0 | 0 | Internal Sync. Mode |
| 1 | 1 | External Composite Sync. Mode |
| 1 | 0 | Line Lock Sync. Mode |
| 1 | 1 | Separate Sync. Mode |

HD PHASE SELECTION

| TST 2 | TST 1 | TST0 | MODE |
|-------|-------|------|-------------|
| 0 | 0 | 0 | NORMAL HD |
| 1 | 1 | 1 | REVERSED HD |
| ELSE | | | REVERSED |

ELECTRONIC SHUTTER

There are two electronic shutter modes in KS7214.

One is a Fixed Iris mode that controls shutter speed through parallel interface with external pin.

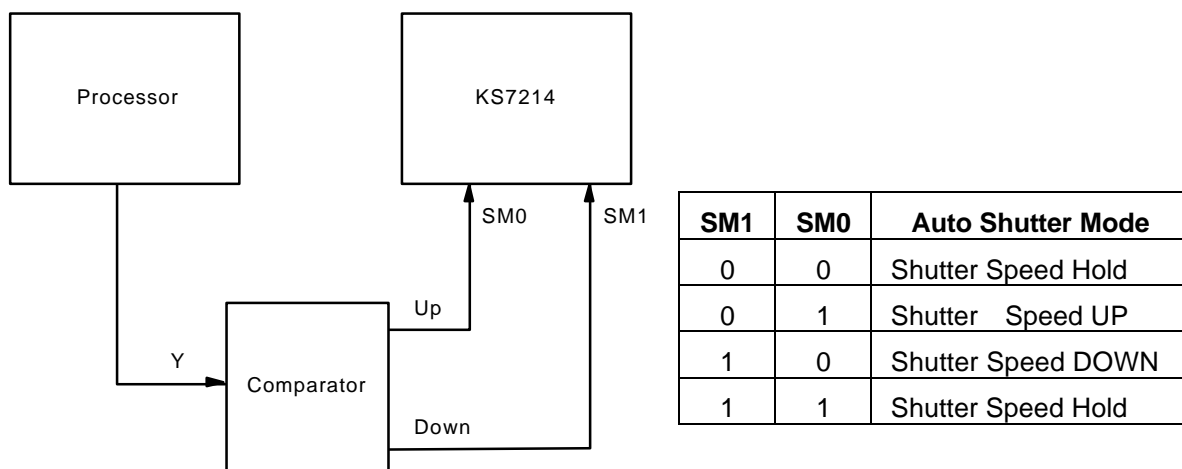
The other is a Auto Iris mode that controls electronic Iris automatically by detecting the light amount of current objects from the signal process IC.

FIXED SHUTTER MODE

| MD1 | FL | SM2 | SM1 | SM0 | SHUTTER SPEEDB | |
|-----|----|-----|-----|-----|----------------|---------|
| | | | | | STEP | REAL |
| L | L | L | L | L | 1/60 | 1/60 |
| L | L | L | L | H | 1/250 | 1/251 |
| L | L | L | H | L | 1/500 | 1/513 |
| L | L | L | H | H | 1/1000 | 1/1006 |
| L | L | H | L | L | 1/2000 | 1/1936 |
| L | L | H | L | H | 1/5000 | 1/5034 |
| L | L | H | H | L | 1/10000 | 1/10489 |
| L | L | H | H | H | 1/30000 | 1/31469 |
| L | H | X | X | X | 1/100 * | 1/101 |
| H | L | L | L | L | 1/50 | 1/50 |
| H | L | L | L | H | 1/250 | 1/249 |
| H | L | L | H | L | 1/500 | 1/510 |
| H | L | L | H | H | 1/1000 | 1/999 |
| H | L | H | L | L | 1/2000 | 1/1923 |
| H | L | H | L | H | 1/5000 | 1/5000 |
| H | L | H | H | L | 1/10000 | 1/10416 |
| H | L | H | H | H | 1/30000 | 1/31249 |
| H | H | X | X | X | 1/120 * | 1/120 |

* FLICKERLESS MODE

AUTO SHUTTER MODE

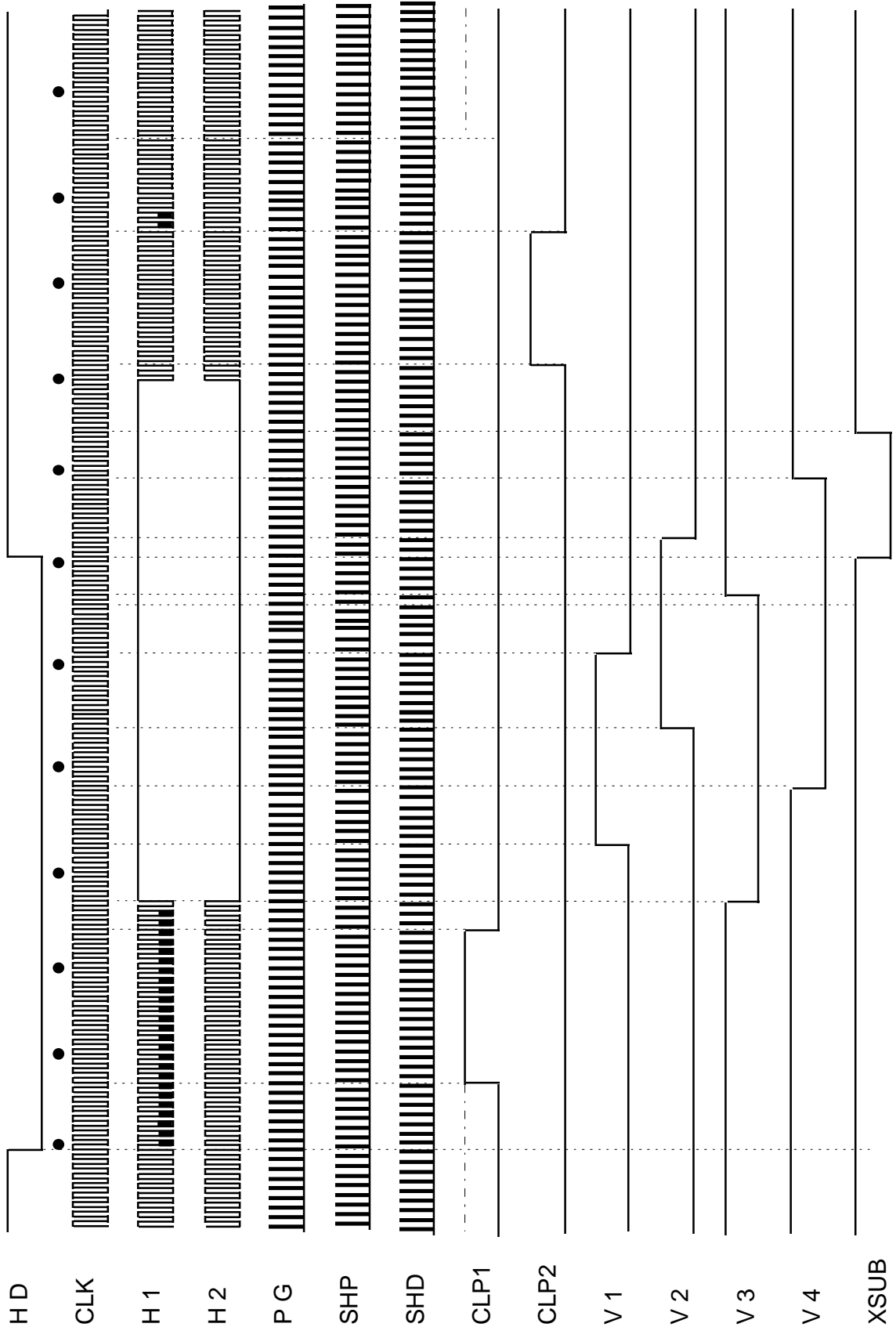


< Auto shutter application >

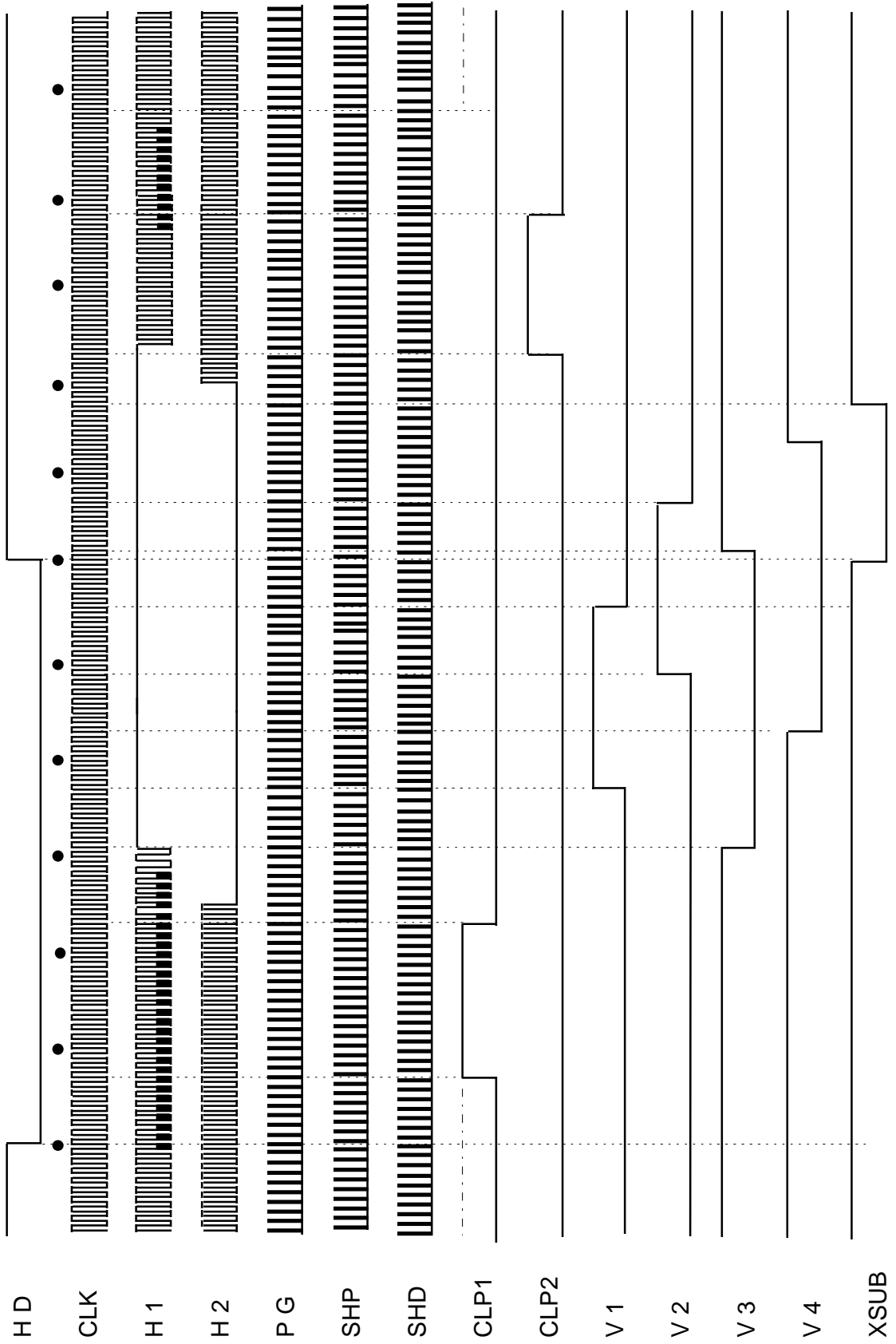
| NO | Step Period | EIA | | CCIR | |
|----|-------------|------|-------------------|------|---------------------|
| | | Step | Shutter Speed | Step | Shutter Speed |
| 1 | 7H | 8 | 1/60 ~ 1/76 | 8 | 1 / 50 ~ 1 / 75 |
| 2 | 5H | 7 | 1/77 ~ 1/91 | 7 | 1 / 76 ~ 1 / 91 |
| 3 | 4H | 9 | 1/92 ~ 1/116 | 9 | 1 / 92 ~ 1 / 115 |
| 4 | 3H | 12 | 1/117 ~ 1/157 | 12 | 1 / 116 ~ 1 / 156 |
| 5 | 2H | 18 | 1/158 ~ 1/247 | 18 | 1 / 157 ~ 1 / 245 |
| 6 | 1H | 50 | 1/248 ~ 1/1154 | 50 | 1 / 246 ~ 1 / 1146 |
| 7 | 1 / 2H | 18 | 1/1155 ~ 1/3402 | 18 | 1 / 1147 ~ 1 / 3378 |
| 8 | 1 / 4H | 12 | 1/3403 ~ 1/9682 | 12 | 1 / 3379 ~ 1 / 9615 |
| 9 | 1 / 8H | 11 | 1/9683 ~ 1/125875 | 11 | 1/9616 ~ 1/124999 |

< Auto shutter speed table >

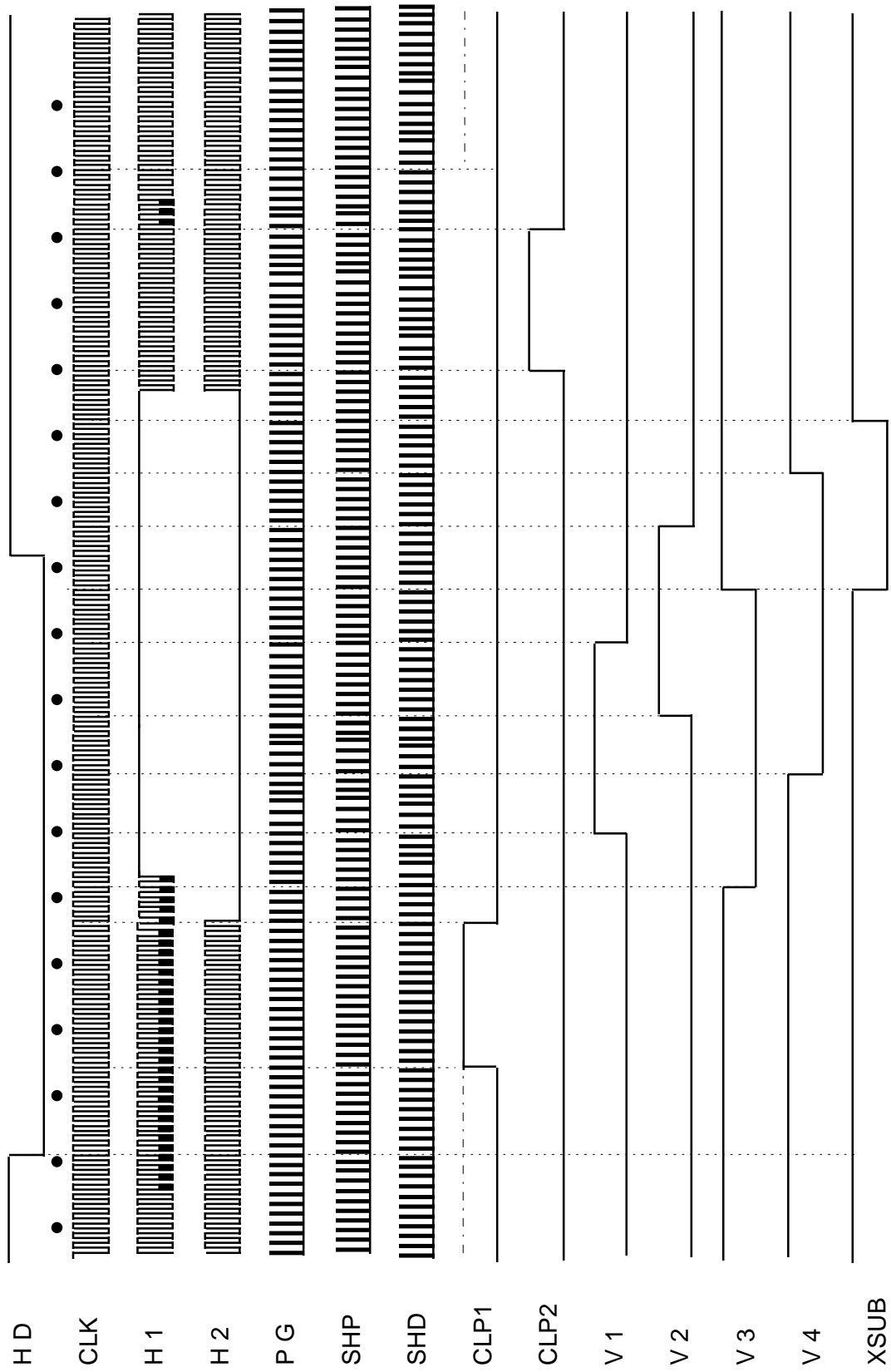
* HORIZONTAL TIMING CHART FOR EIA NORMAL



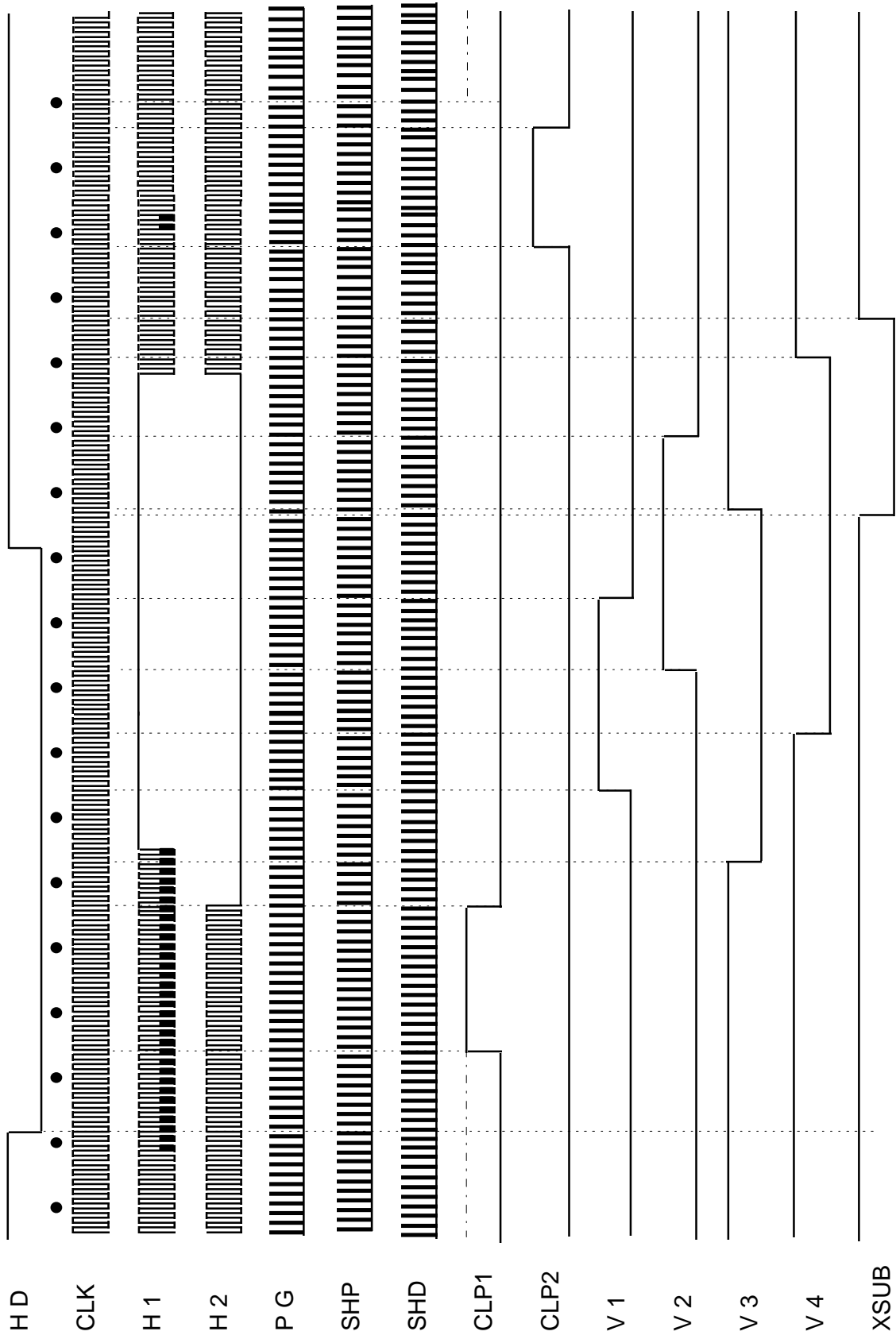
* HORIZONTAL TIMING CHART FOR CCIR NORMAL



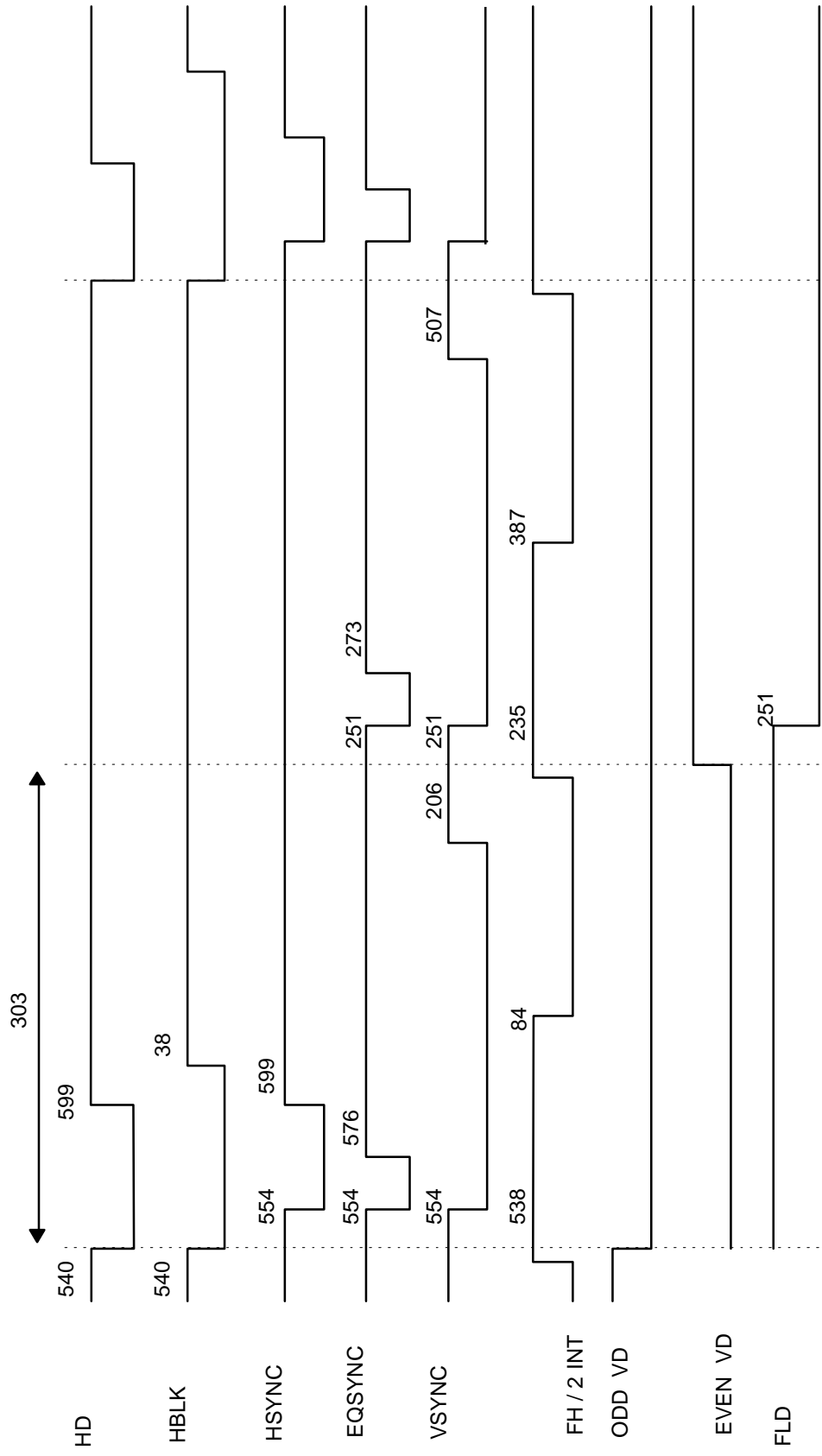
* HORIZONTAL TIMING CHART FOR EIA HI8



* HORIZONTAL TIMING CHART FOR CCIR HI8

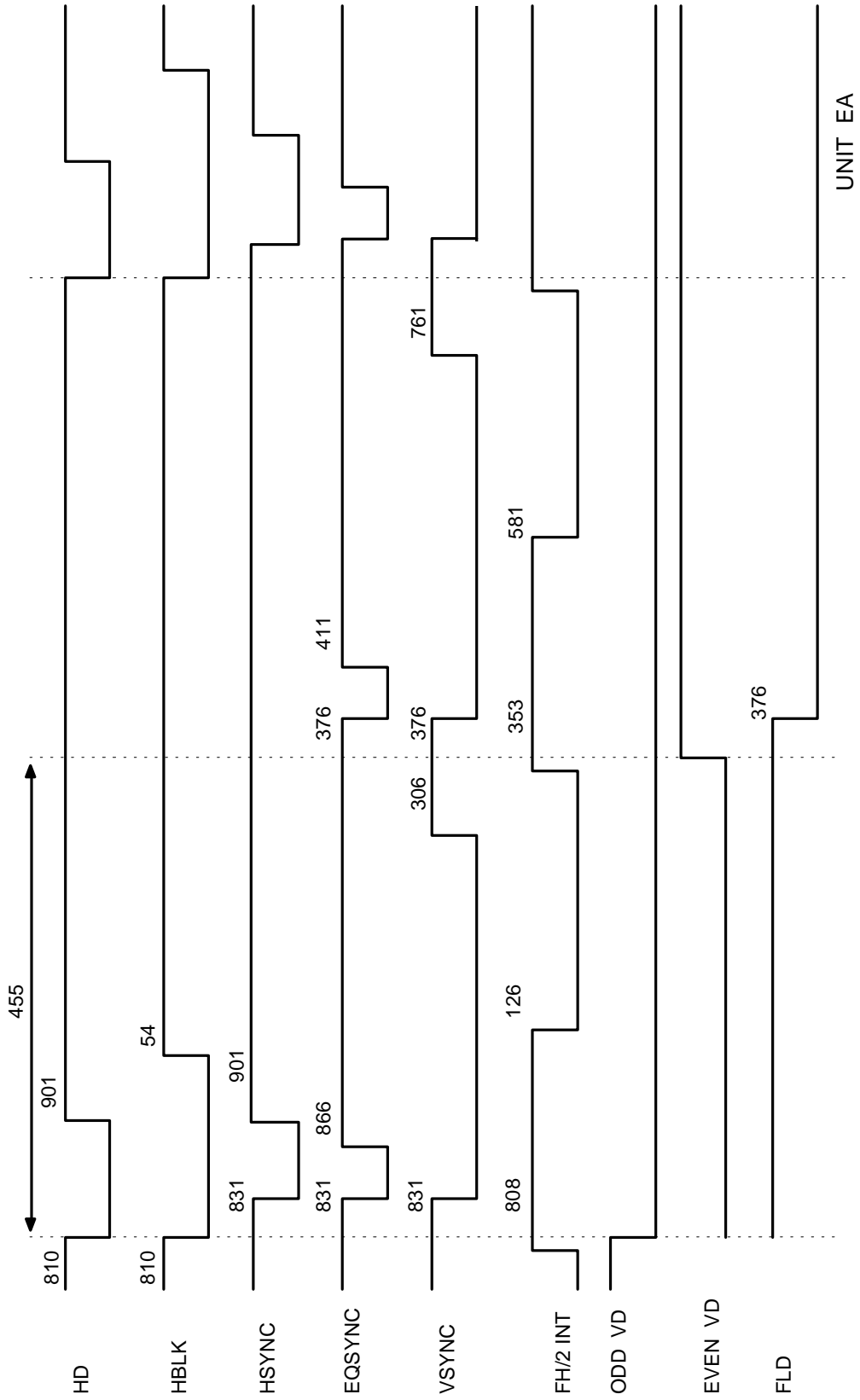


* HORIZONTAL TIMING CHART FOR EIA NORMAL



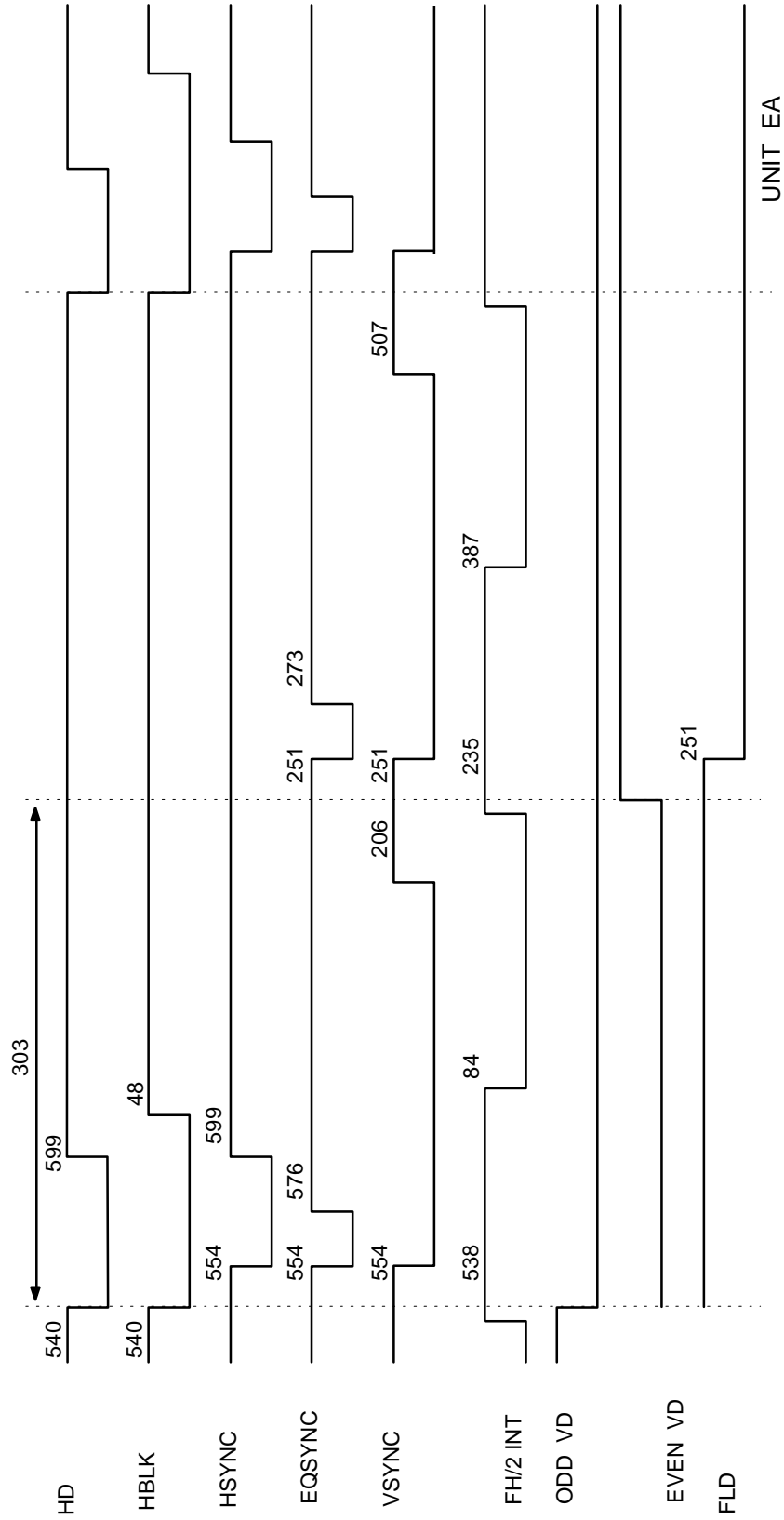
UNIT EA

* HORIZONTAL TIMING CHART FOR EIA H18

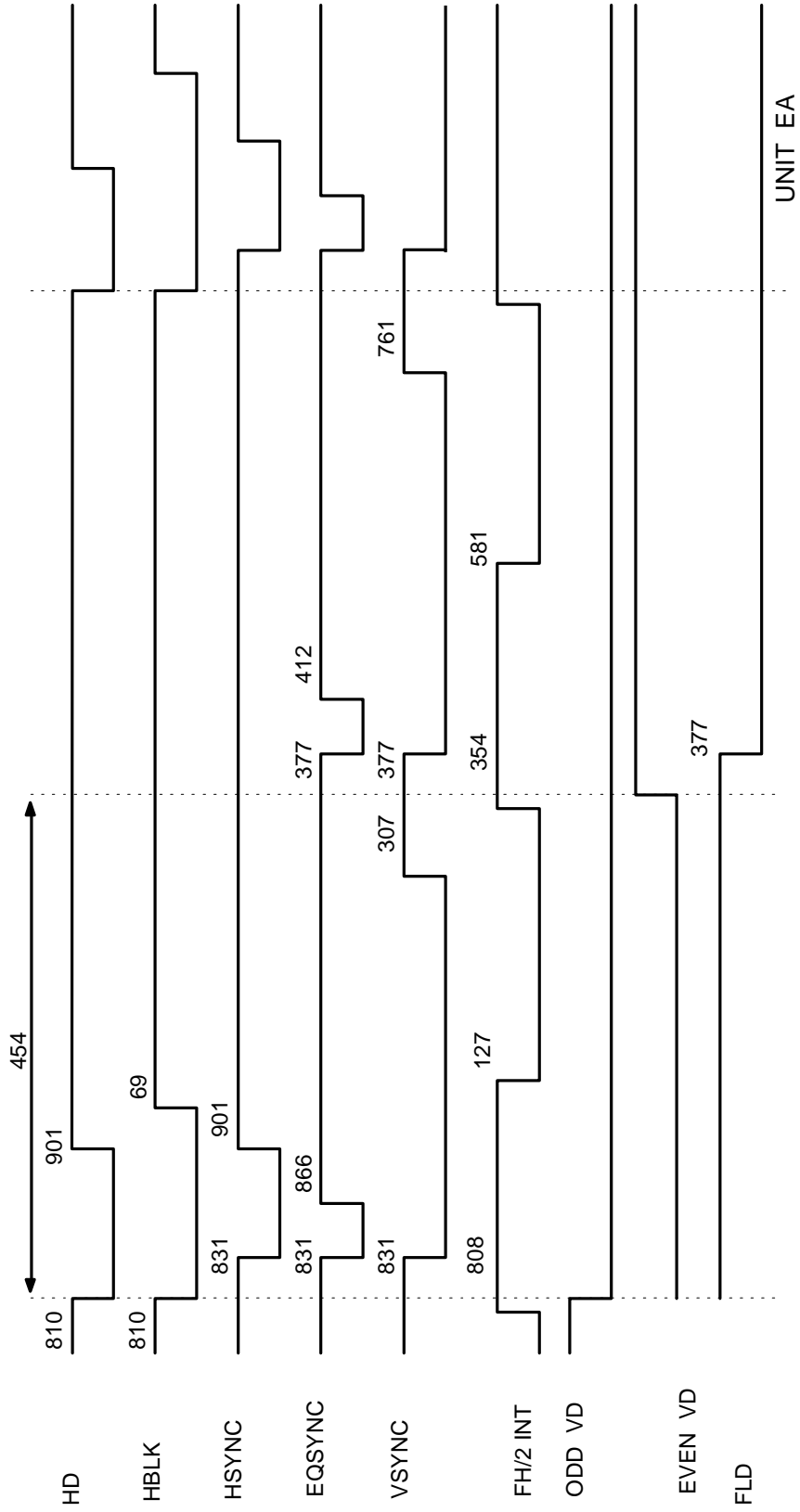


UNIT EA

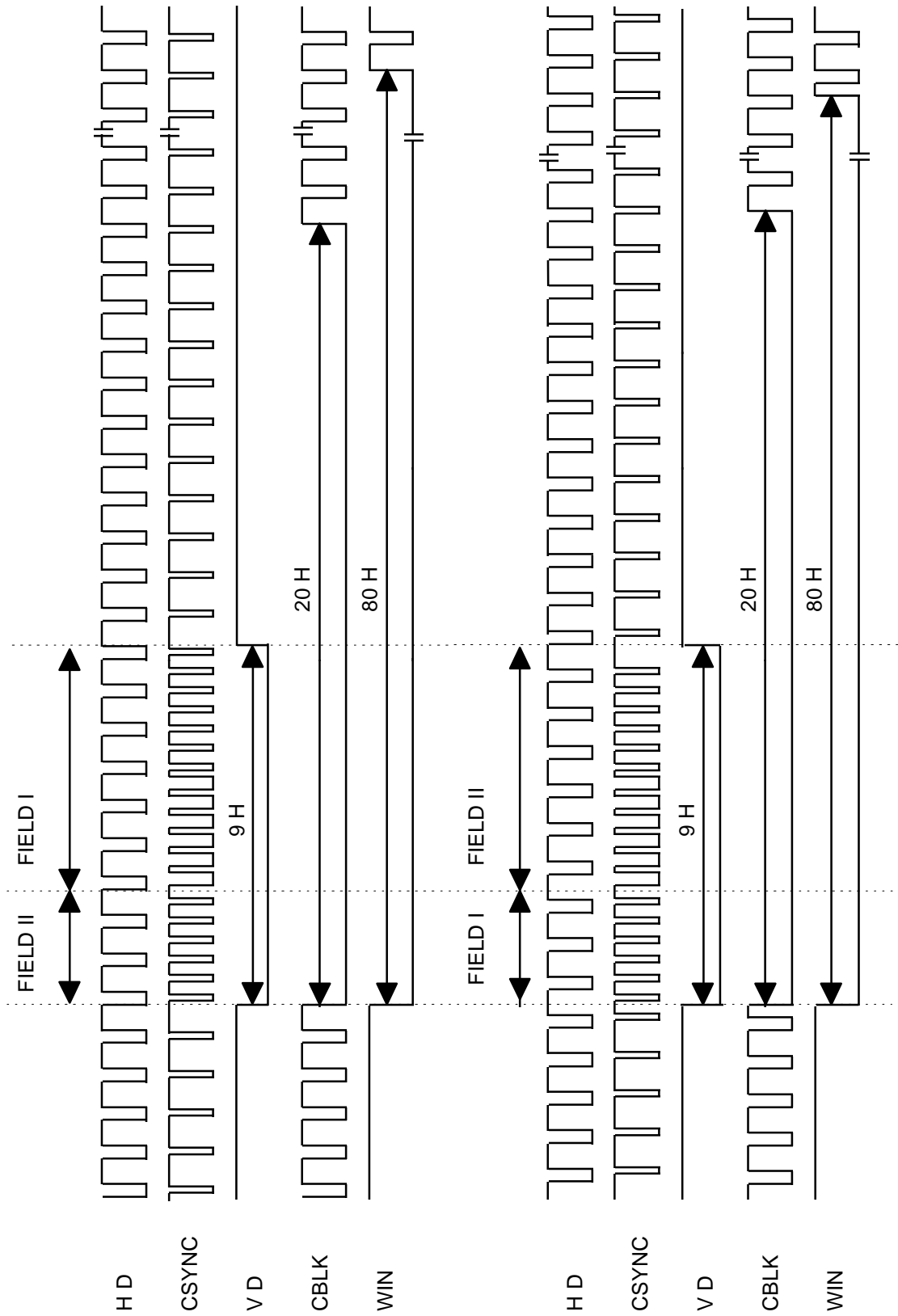
* HORIZONTAL TIMING CHART FOR CCIR NORMAL



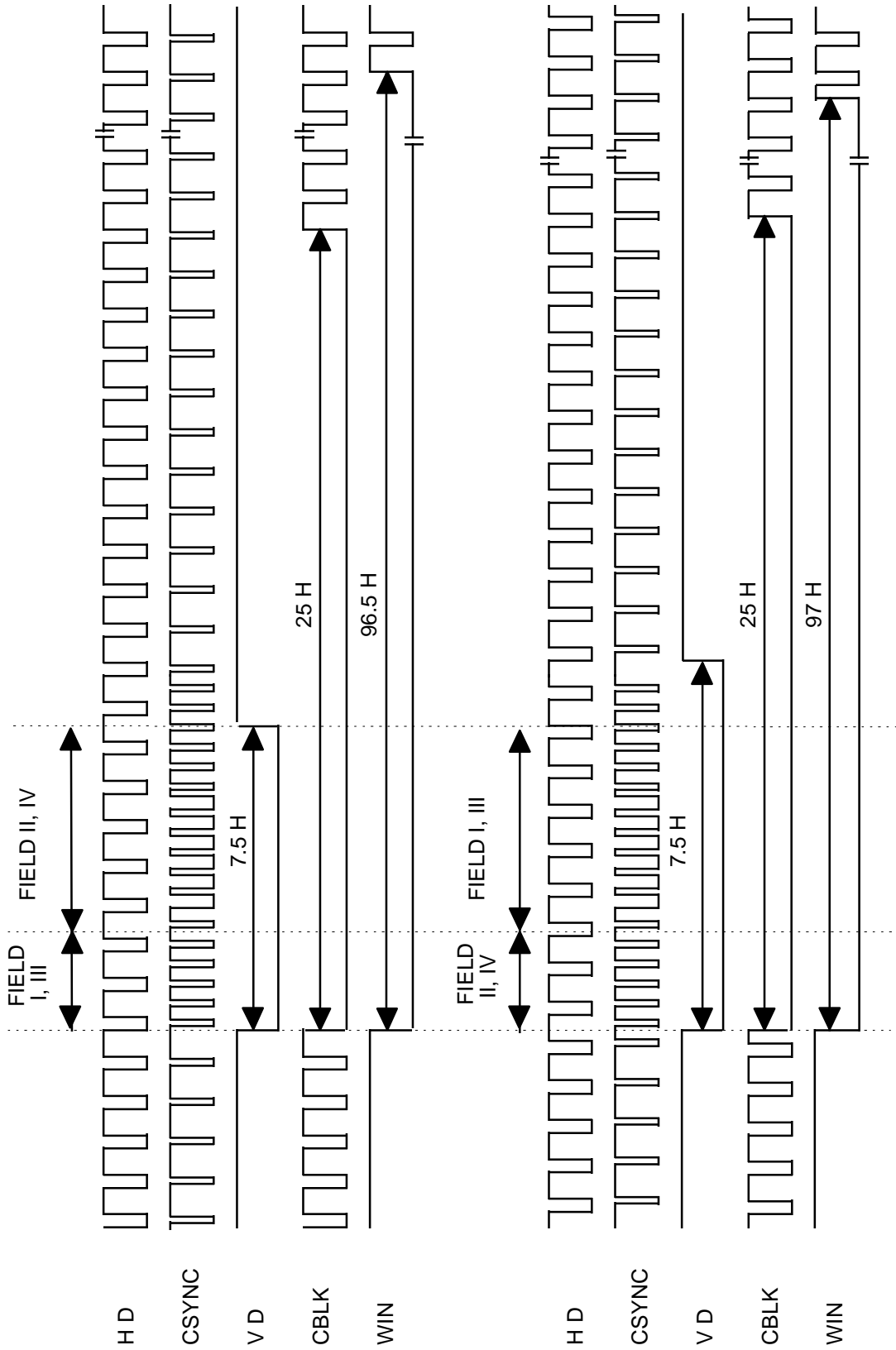
* HORIZONTAL TIMING CHART FOR CCIR HI8



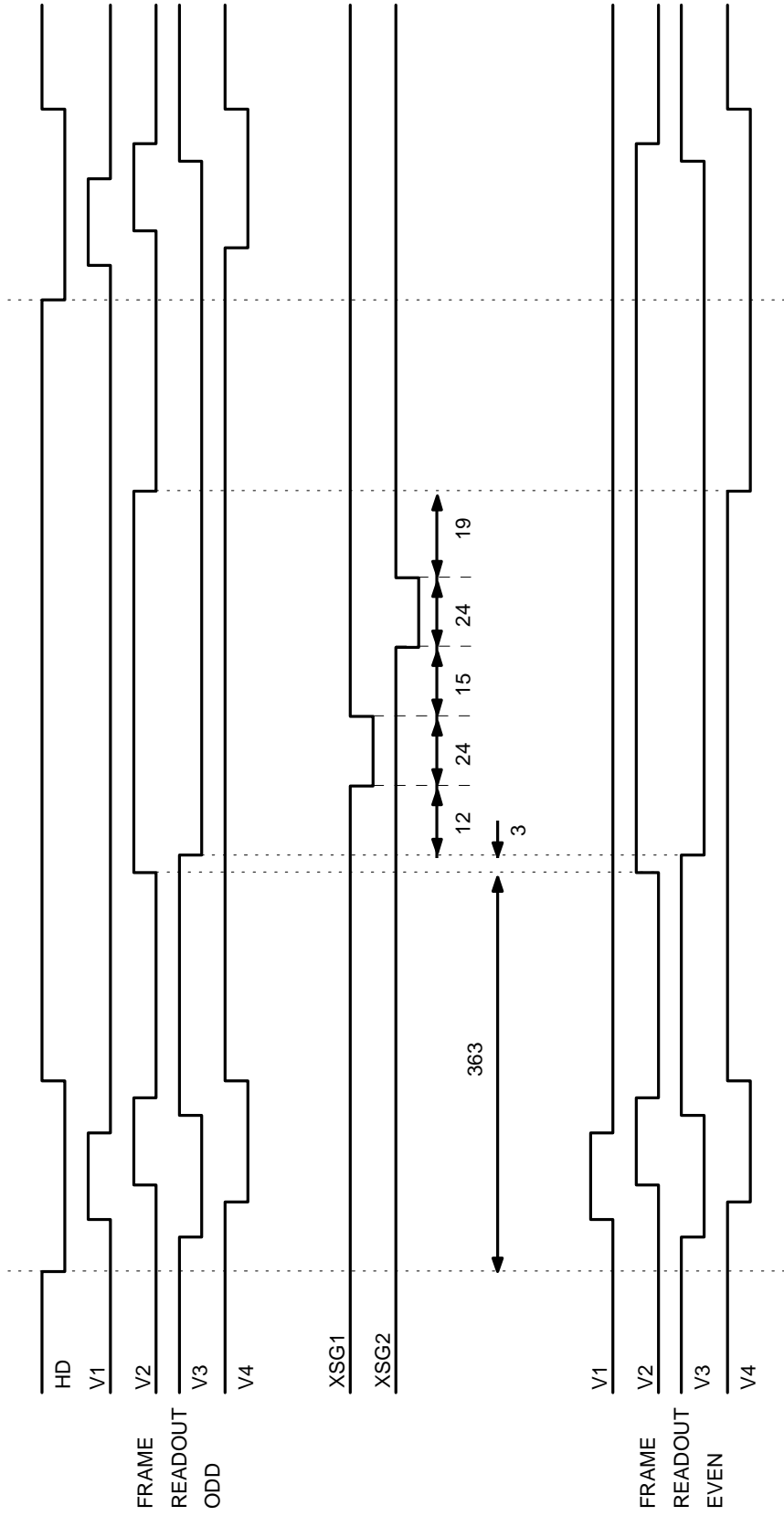
* VERTICAL TIMING CHART FOR EIA



* VERTICAL TIMING CHART FOR CCIR

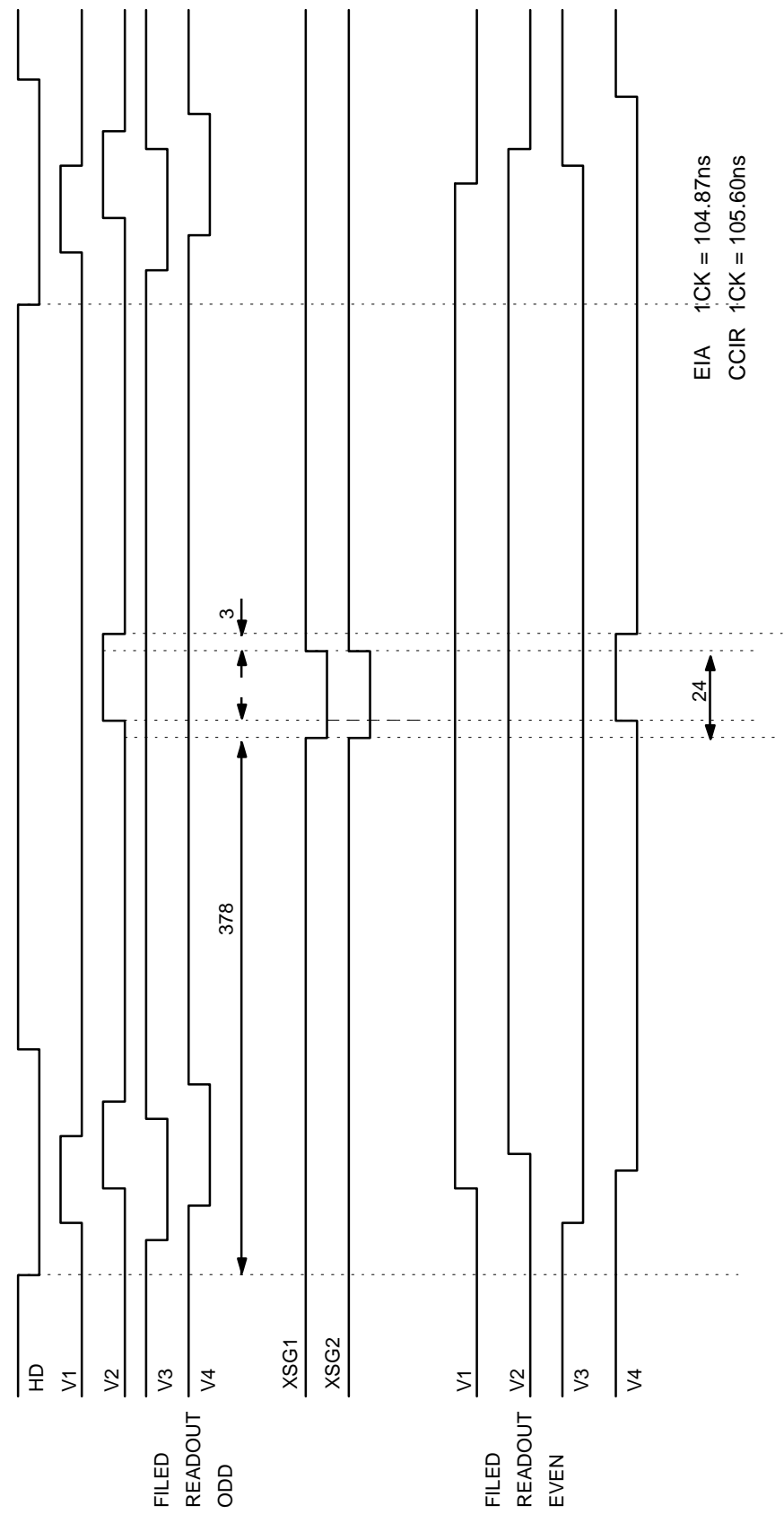


* VERTICAL CCD REGISTER DRIVING PULSE TIMING CHART FOR NORMAL EIA AND CCIR



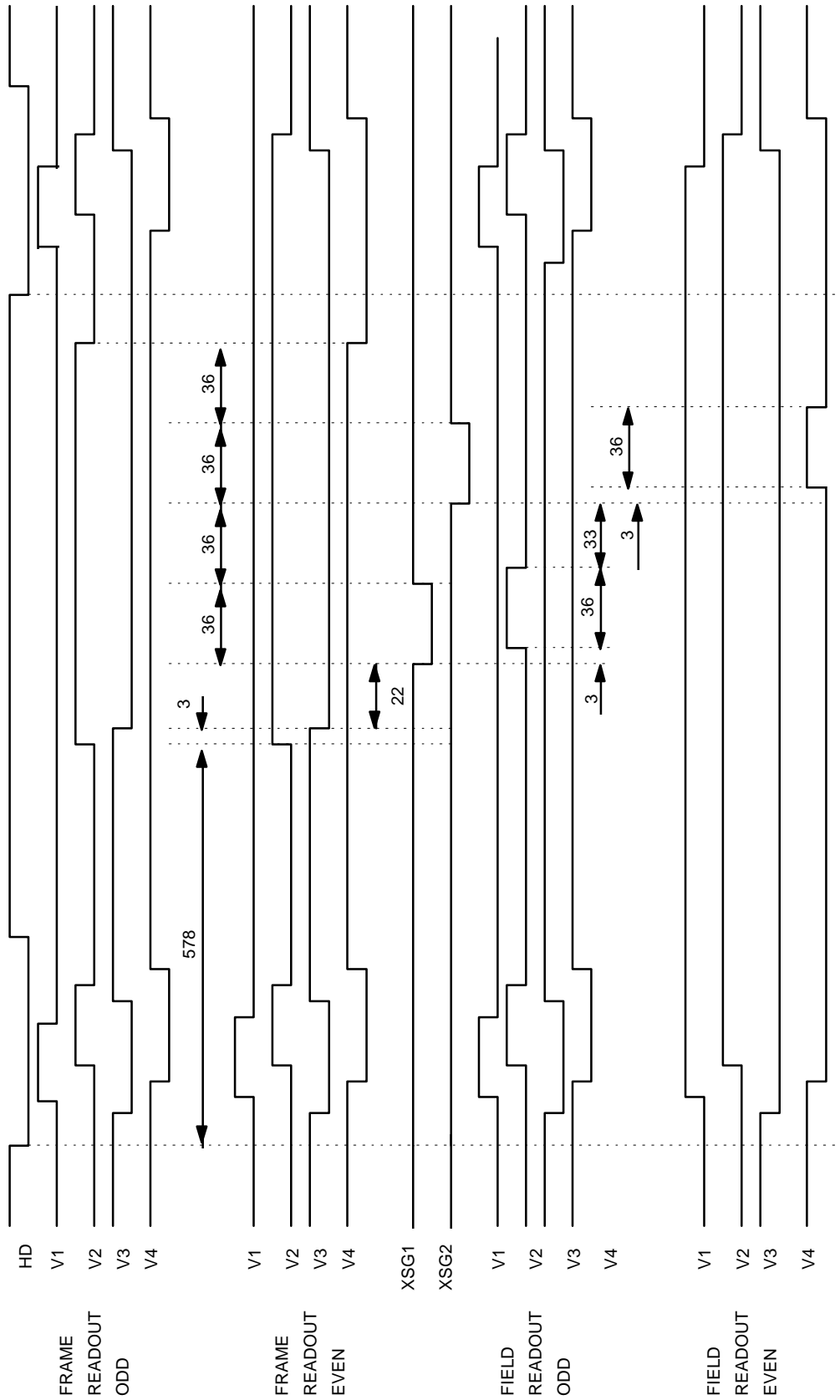
EIA 1CK = 104.87ns
 CCIR 1CK = 105.60ns

* VERTICAL CCD REGISTER DRIVING PULSE TIMING CHART FOR NORMAL EIA AND CCIR



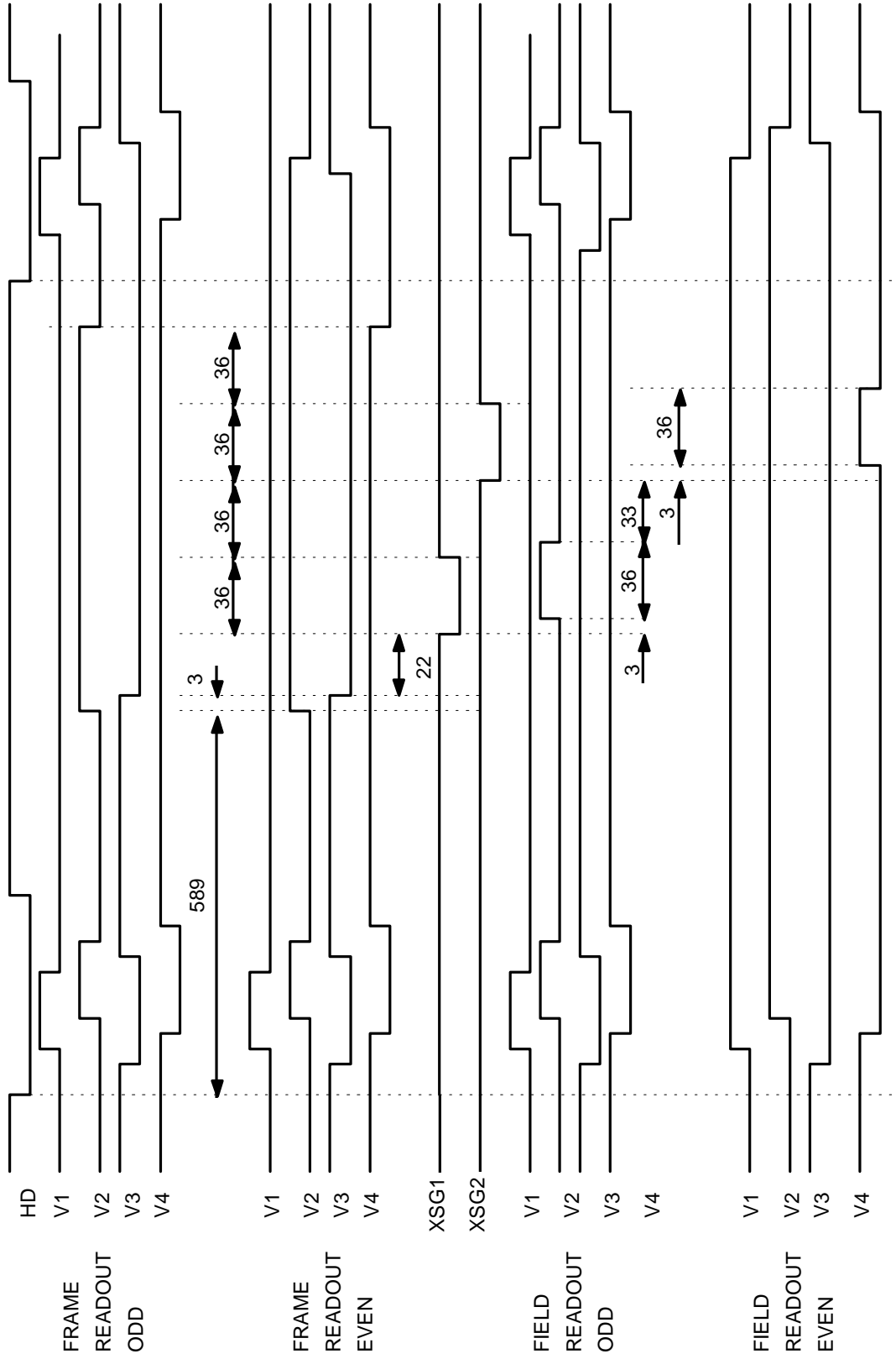
UNIT : 1CK = 69.84ns

* VERTICAL CCD REGISTER DRIVING PULSE TIMING CHART FOR H18 EIA

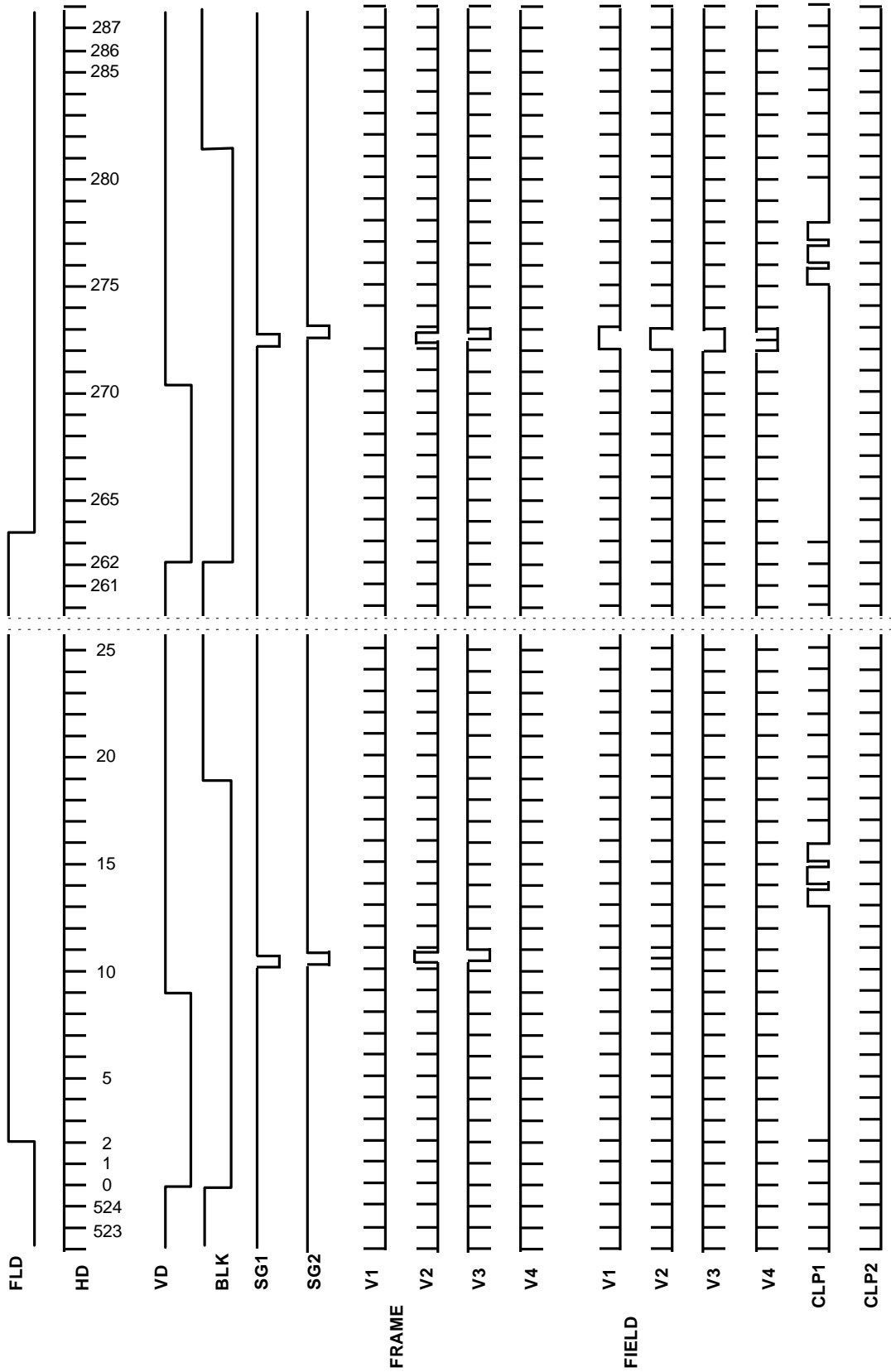


UNIT : 1CK = 70.48ns

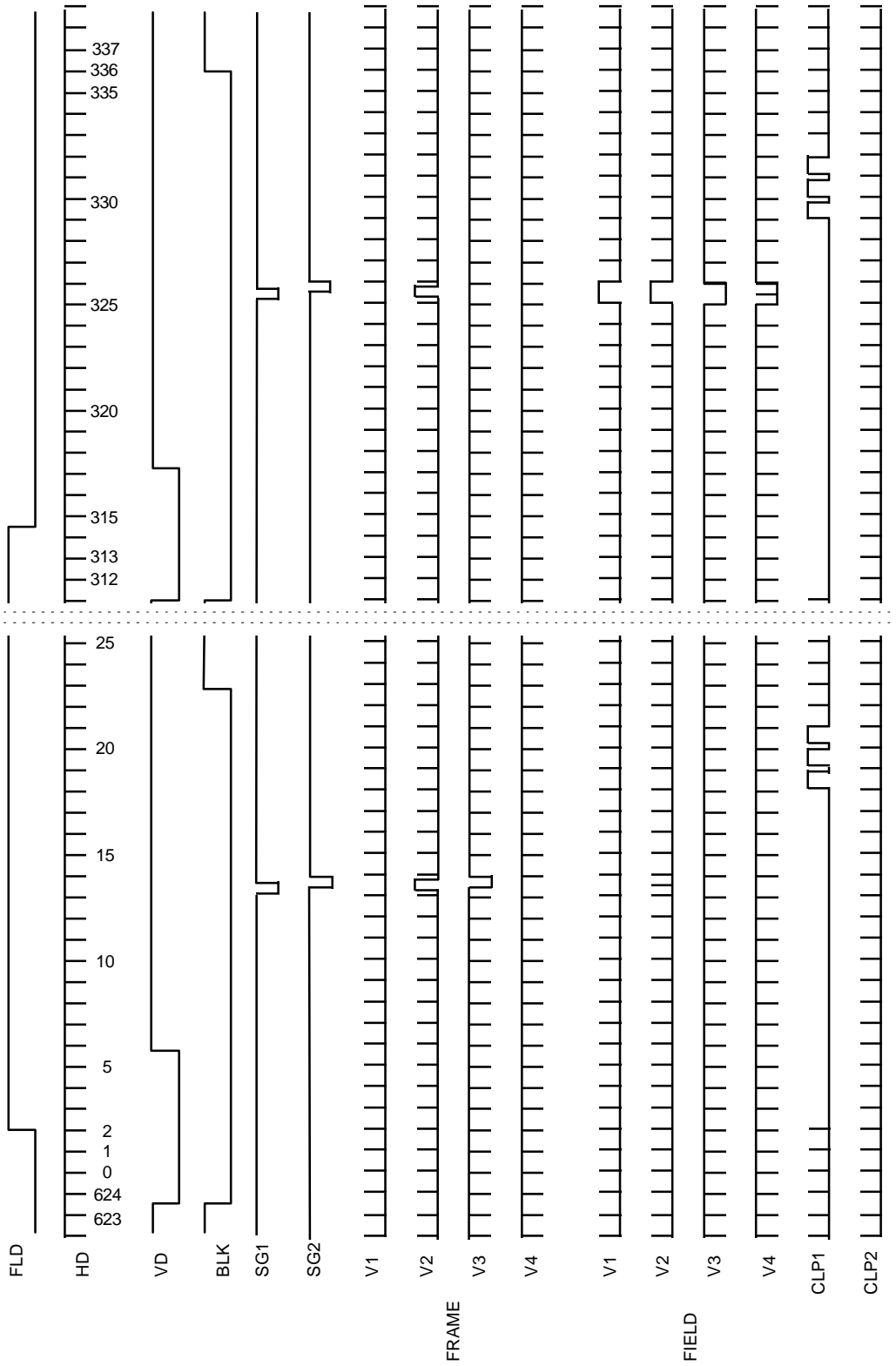
* VERTICAL CCD REGISTER DRIVING PULSE TIMING CHART FOR HI8 CCIR



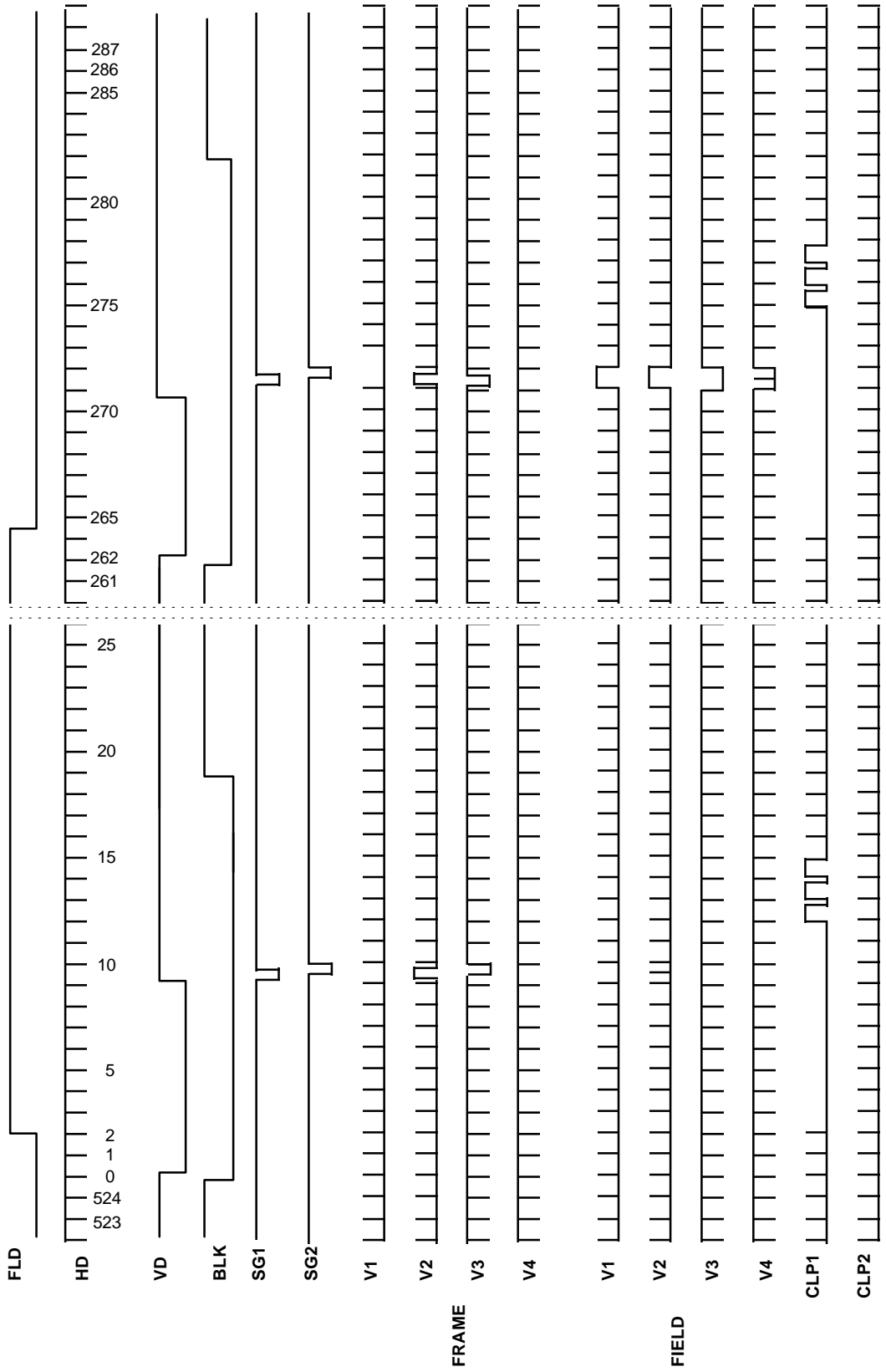
NORMAL EIA VERTICAL TIMING CHART AT INTERLACE



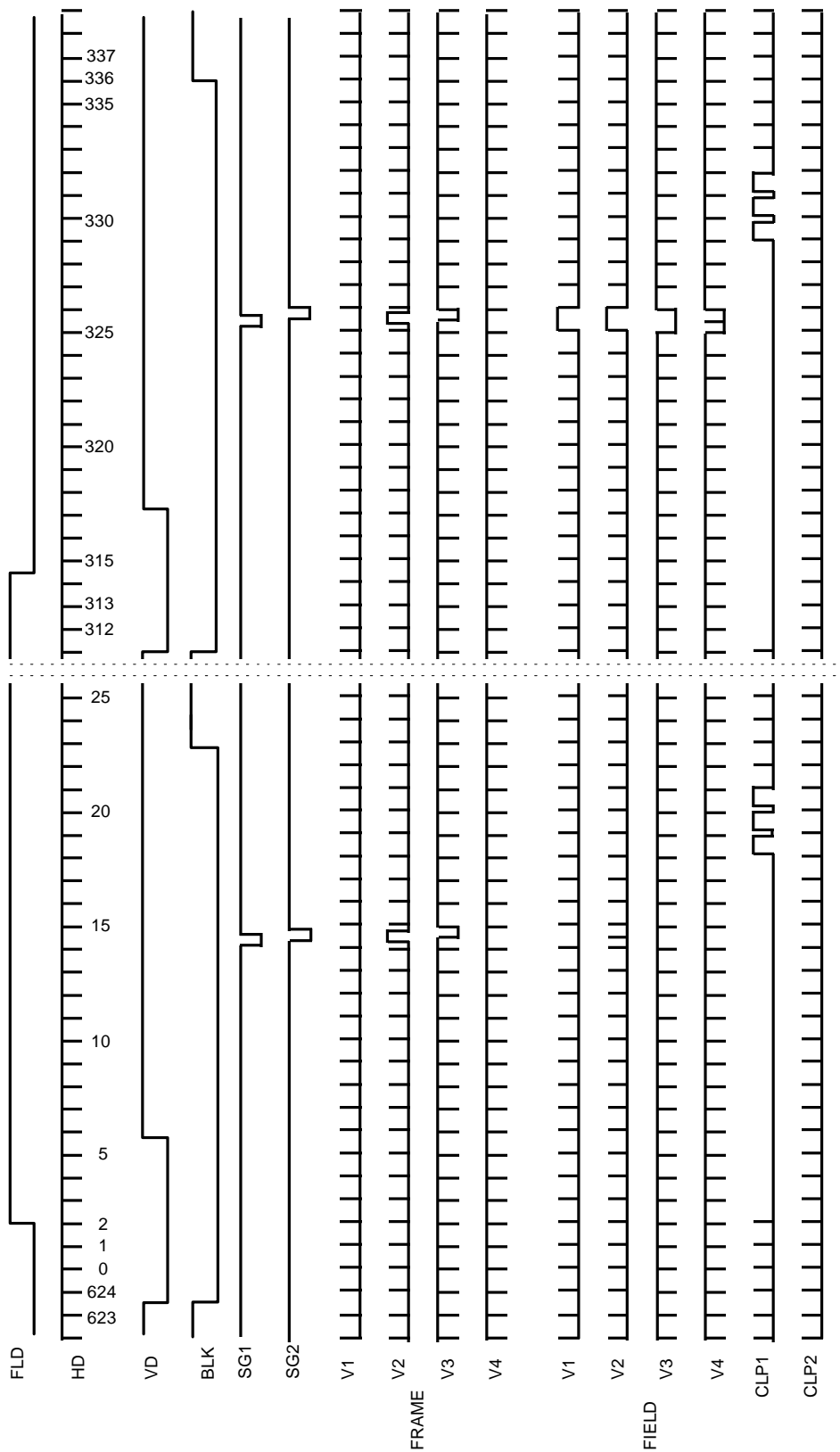
NORMAL CCIR VERTICAL TIMING CHART AT INTERLACE



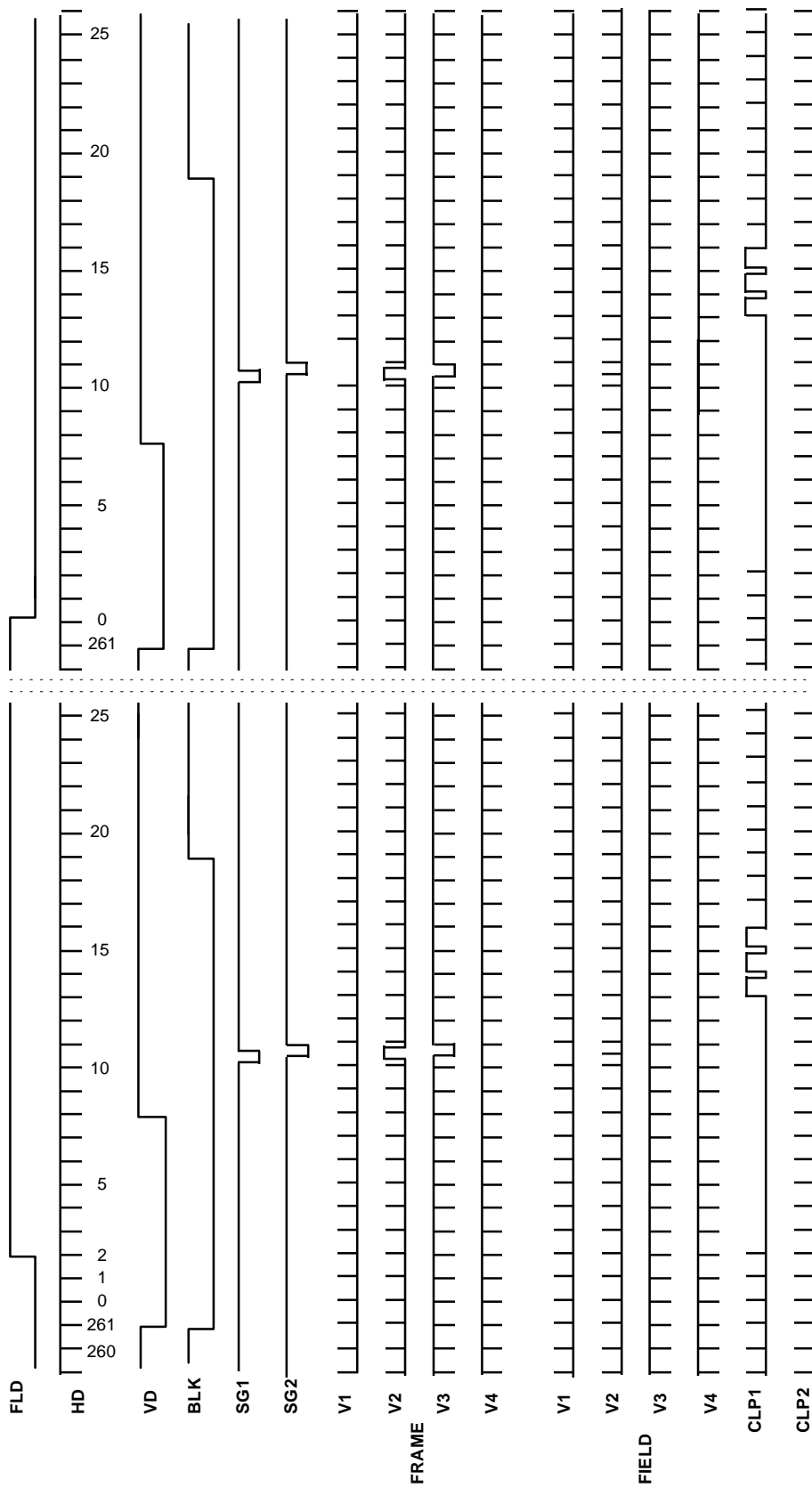
H18 EIA VERTICAL TIMING CHART AT INTERLACE



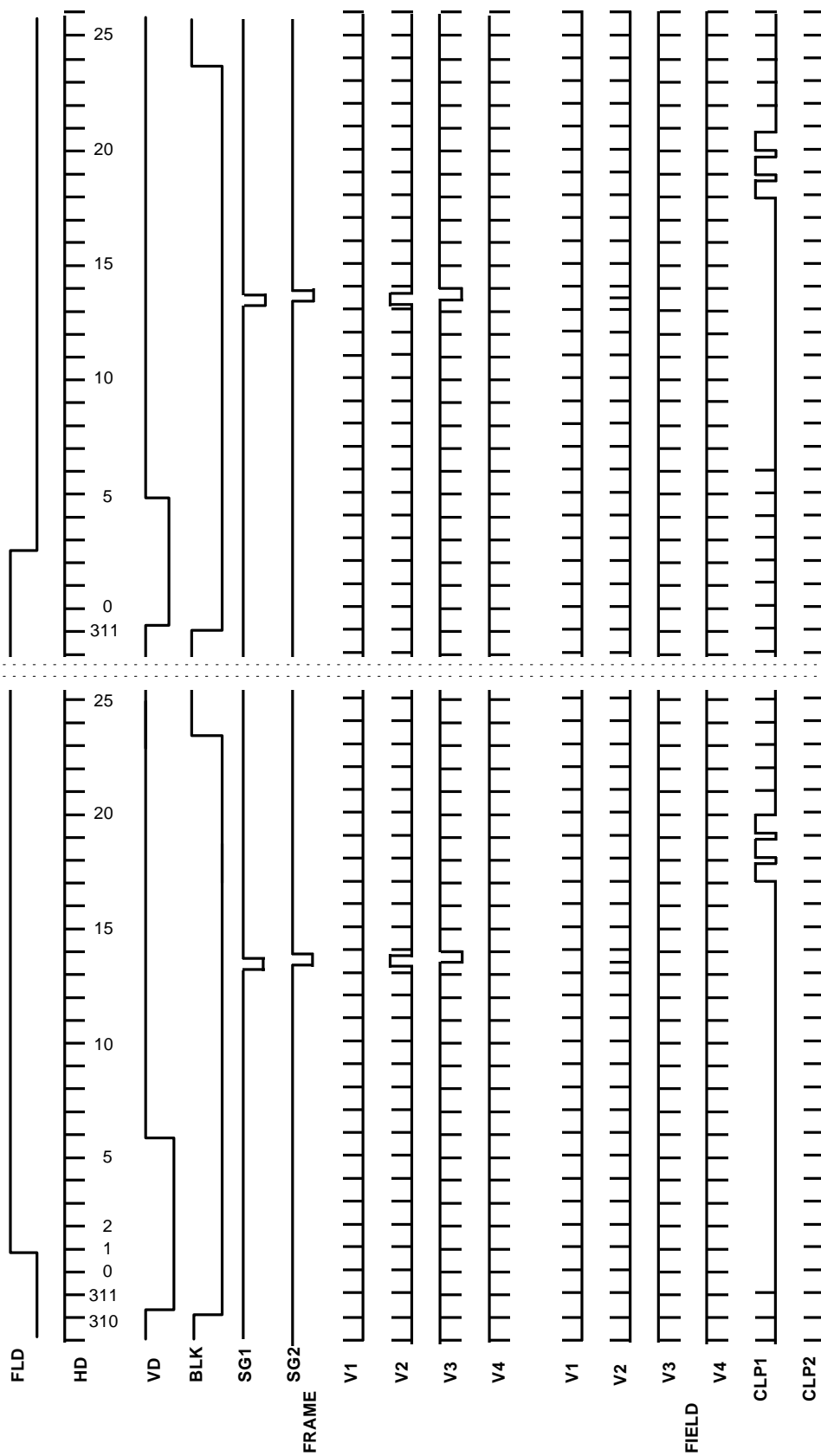
H18 CCIR VERTICAL TIMING CHART AT INTERLACE



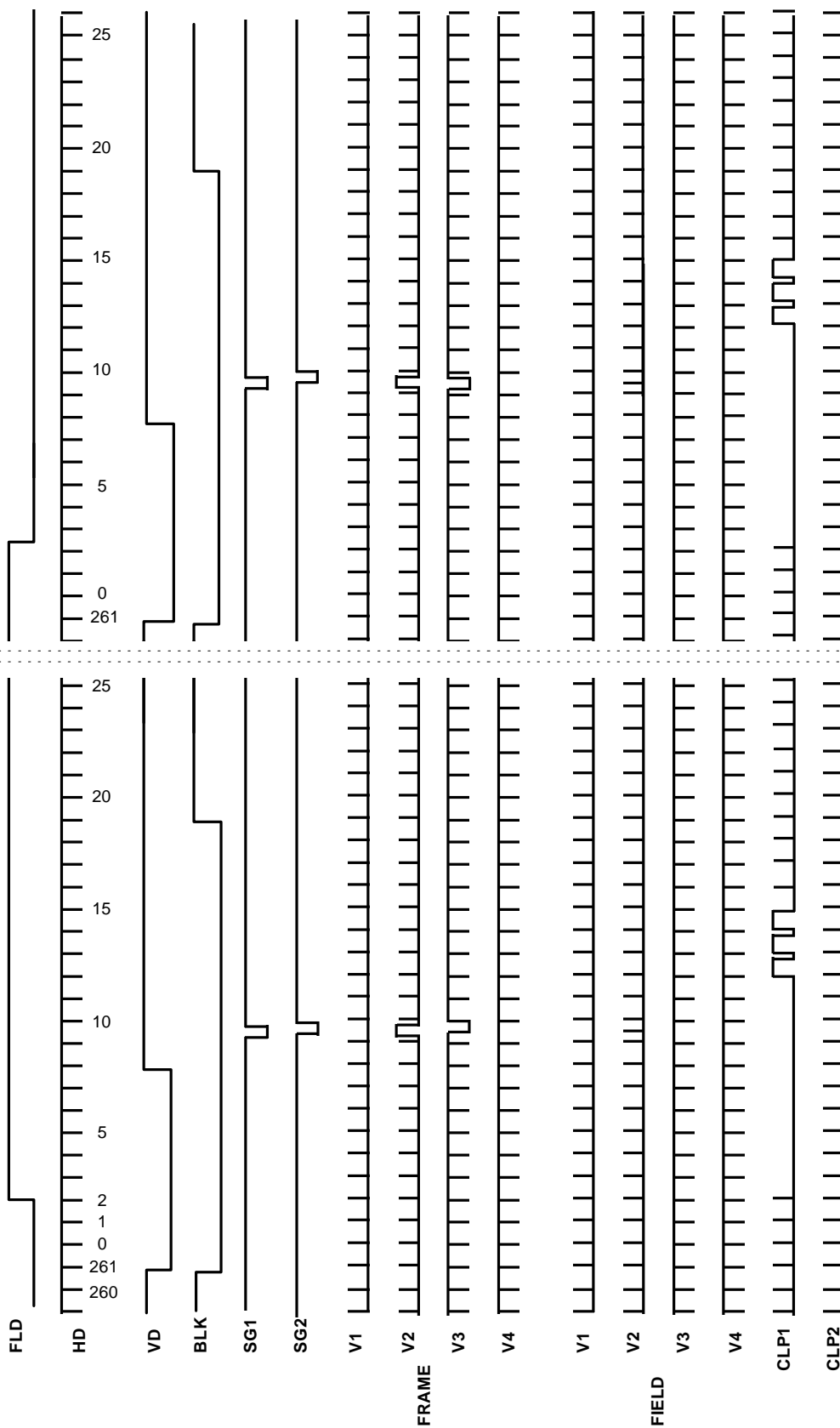
NORMAL EIA VERTICAL TIMING CHART AT NON - INTERLACE



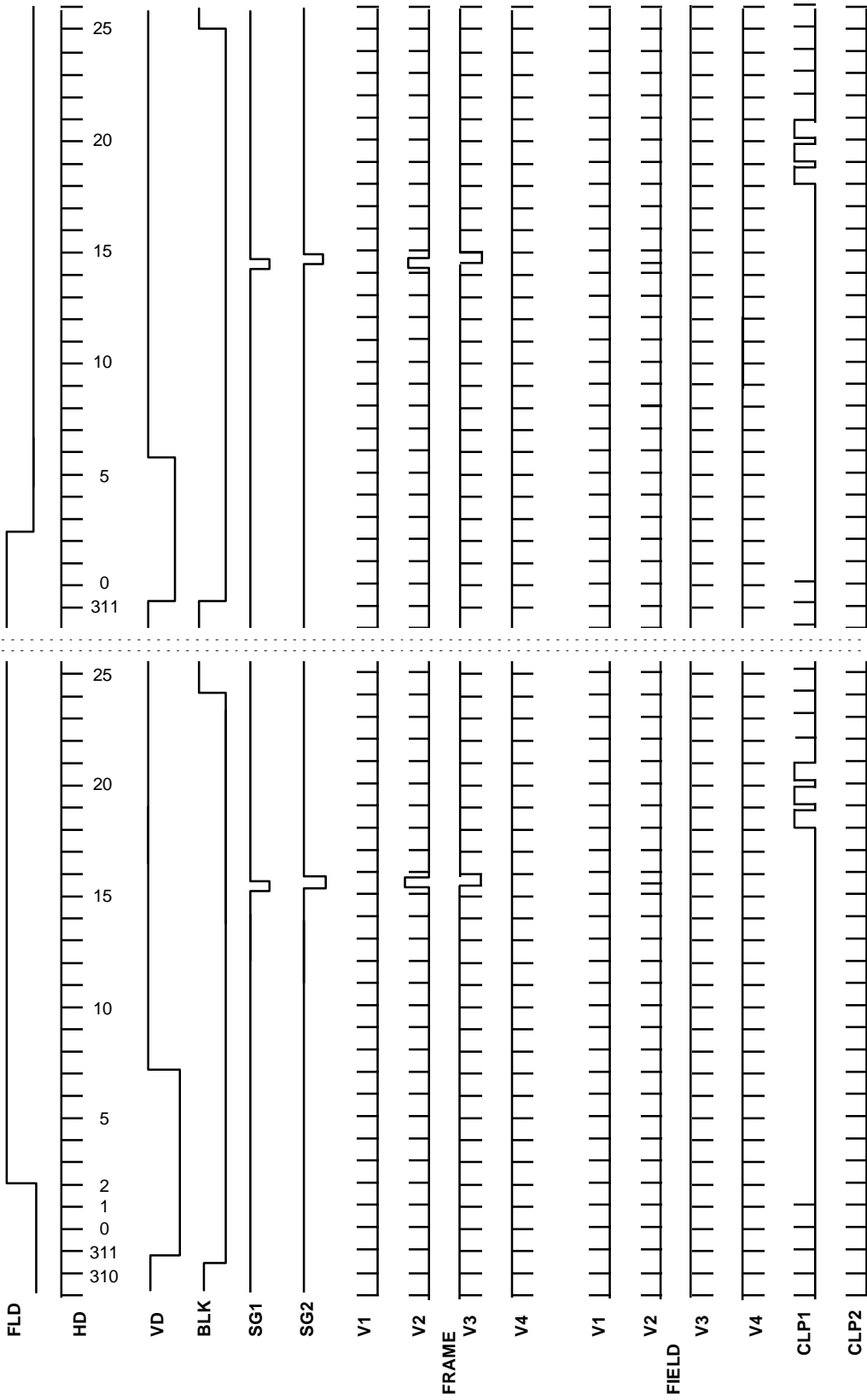
NORMAL CCIR VERTICAL TIMING CHART AT NON - INTERLACE



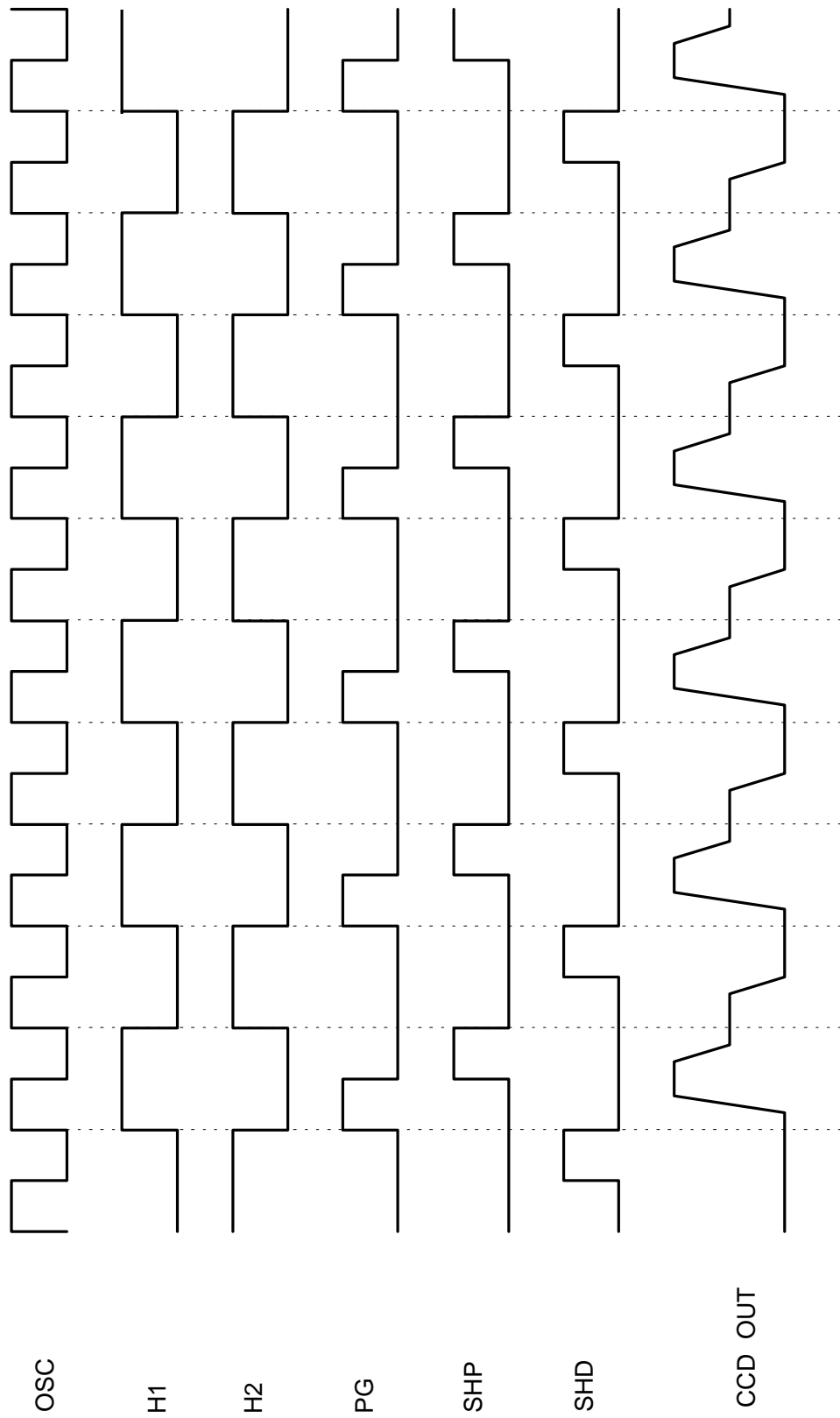
H18 EIA VERTICAL TIMING CHART AT NON - INTERLACE



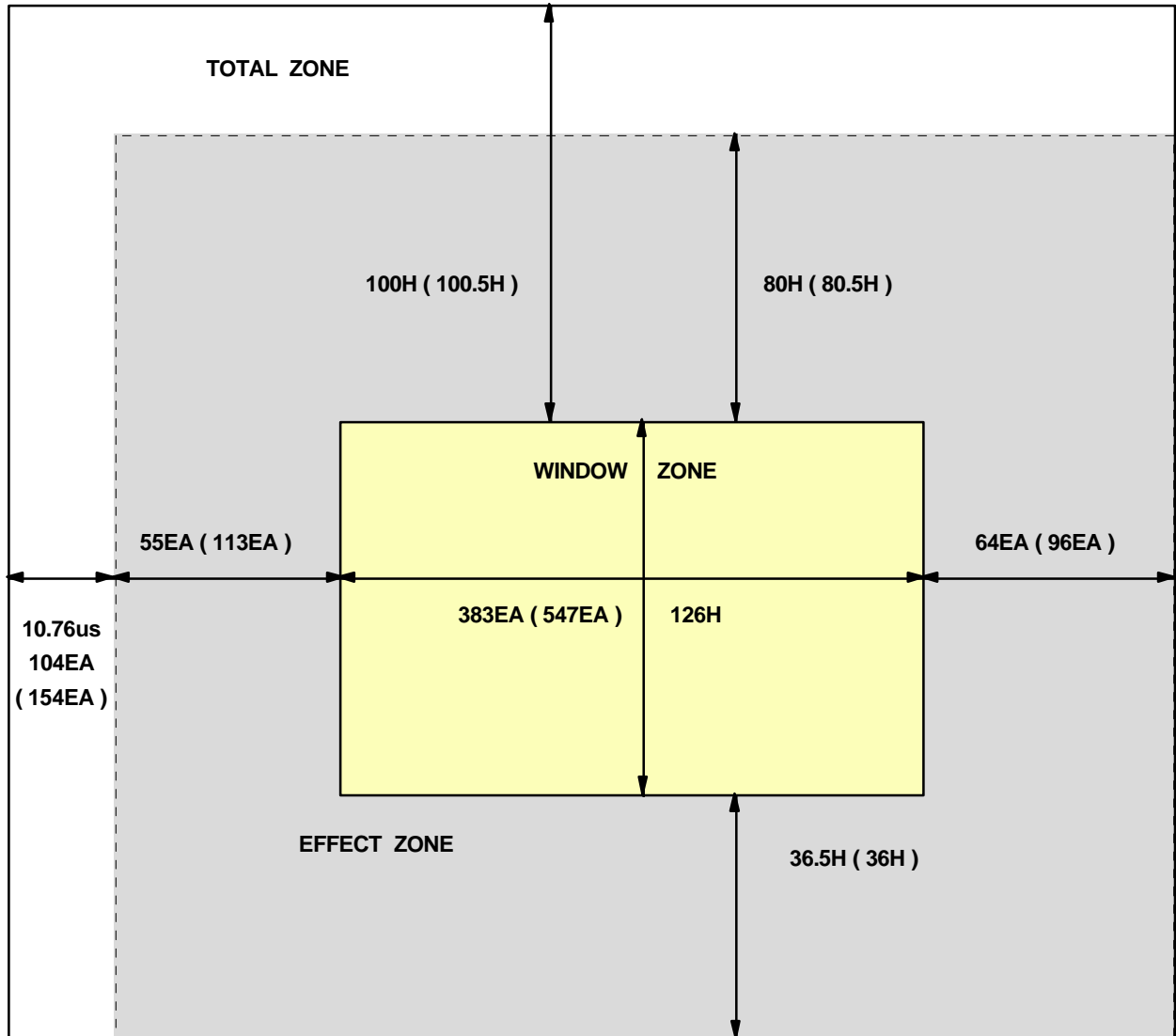
H18 CCIR VERTICAL TIMING CHART AT NON - INTERLACE



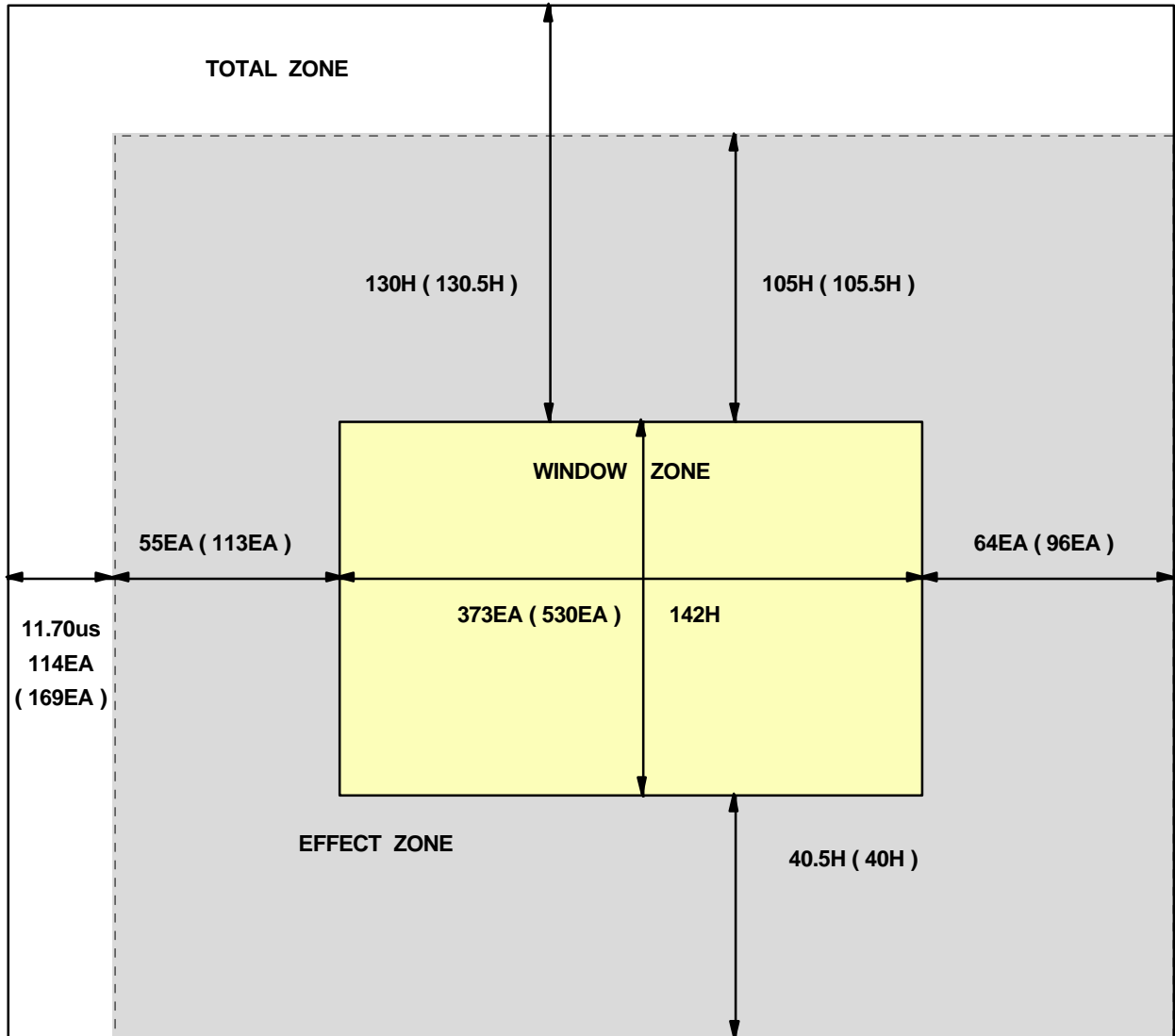
HIGH SPEED PHASE TIMING CHART



EIA NORMAL/Hi8 WINDOW AREA



CCIR NORMAL/H18 WINDOW AREA

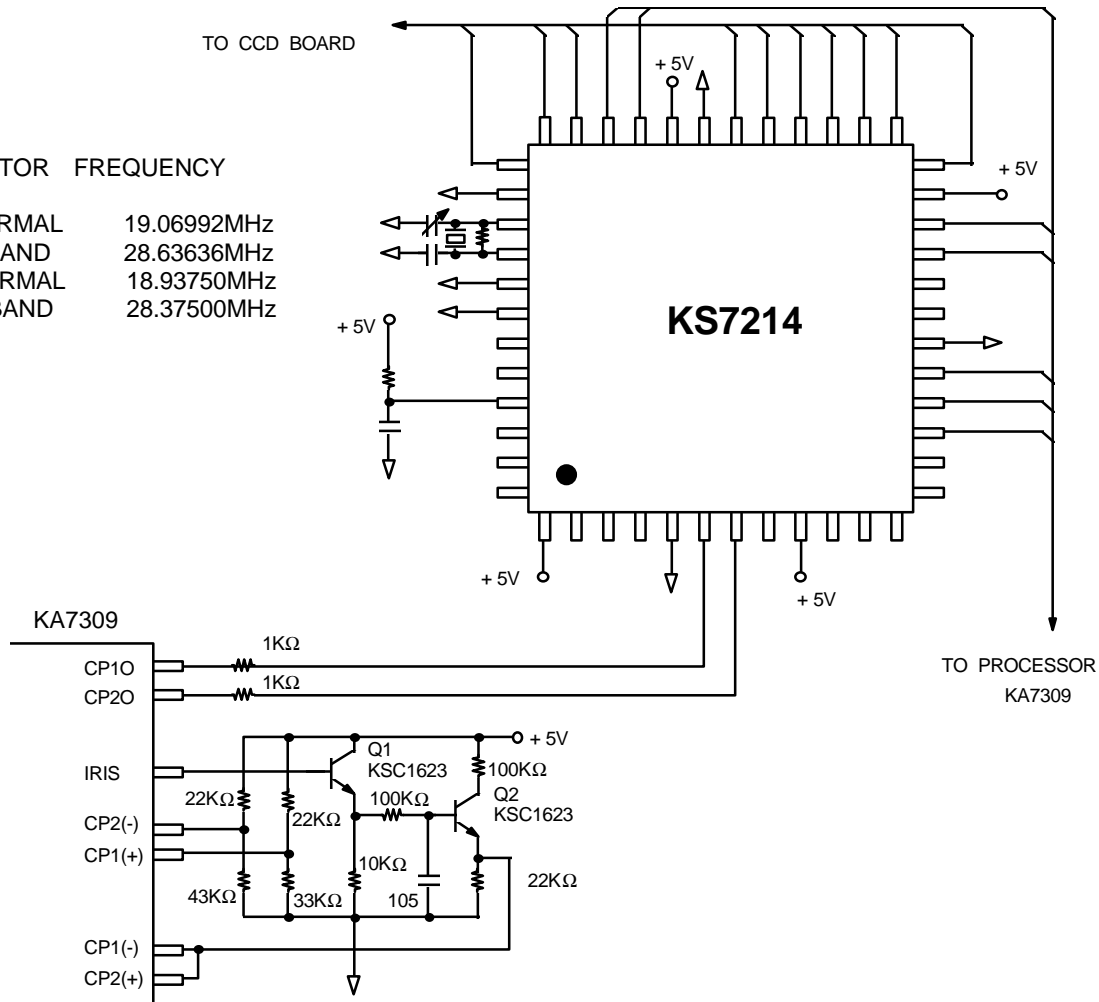


APPLIATION EXAMPLE

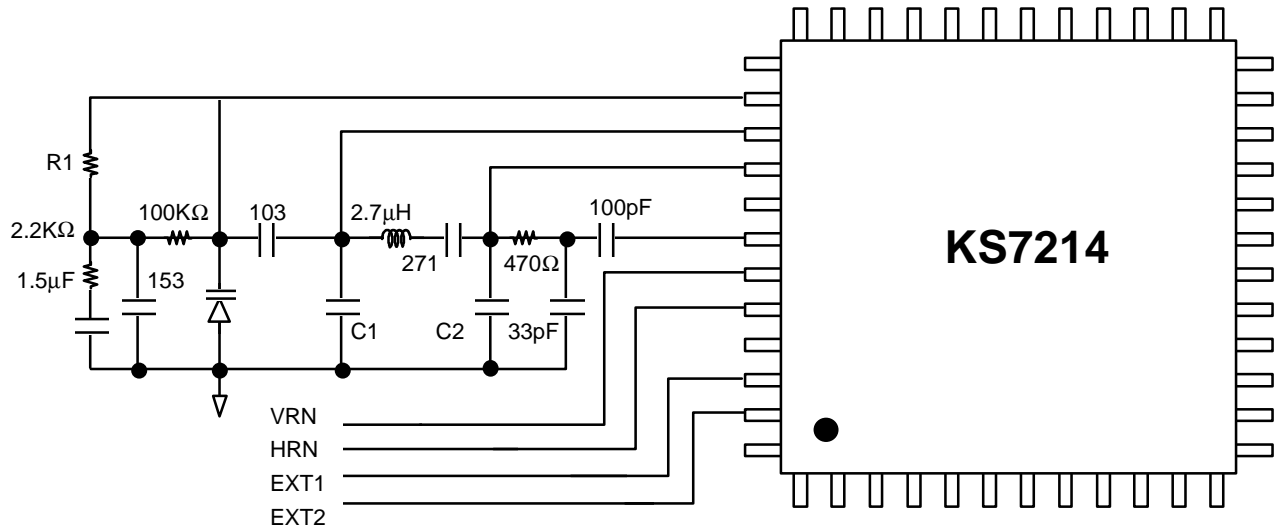
EIA NORMAL AUTO IRIS MODE APPLICATION

OSCILLATOR FREQUENCY

| | |
|-------------|-------------|
| EIA NORMAL | 19.06992MHz |
| EIA HIBAND | 28.63636MHz |
| CCIR NORMAL | 18.93750MHz |
| CCIR HIBAND | 28.37500MHz |



APPLICATION EXAMPLE (Continued)



| MODE | EXT1 | EXT2 | VRN | HRN |
|-----------|------|------|------|-----------|
| COMP.SYNC | 0 | 1 | - | COMP.SYNC |
| LINE LOCK | 1 | 0 | 60Hz | - |
| SEPA.SYNC | 1 | 1 | VD | HD |

PACKAGE DIMENSION

48-QFP-0707

unit : mm

