

Signal Processor LSI for Single-Chip CCD Color Camera

Description

The CXD3142R is a signal processor LSI for Ye, Cy, Mg and G single-chip CCD color cameras. In addition to basic camera signal processing functions, it includes an AE/AWB detection circuit, a sync signal generation circuit and an external sync circuit, etc.

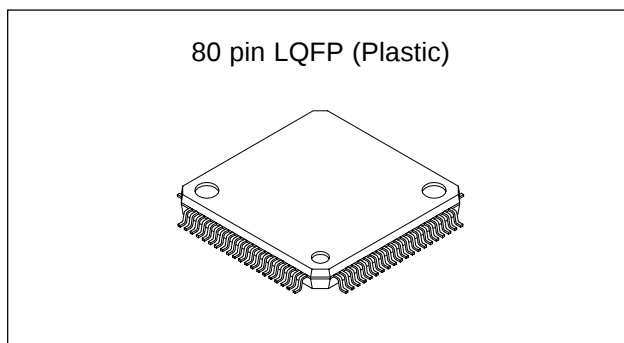
This chip also has a built-in microcontroller to realize basic camera functions such as AE/AWB without an external microcomputer.

Features

- Generates timing pulses to drive the 510H CCD image sensor
 - Sync signal generation function
 - Luminance/chroma signal processing
 - Luminance/chroma signal integral detector
 - Automatically control camera function
- Supports NTSC/PAL modes
- Supports 510H system CCD image sensor
- Built-in 9-bit A/D converter
- Analog composite output
 - Built-in digital encoder
 - 10-bit D/A converter output
- Digital output
 - YUV 8-bit multiplex output
- Supports external sync functions
- AE/AWB detector
- Block control functions with a built-in microcontroller
 - AE/AWB/YC/CLAMP/SG control functions
- Peripheral IC communication control functions
 - EVR, EEPROM communication control
- Serial communication function
 - Microcomputer (3 wires)

Absolute Maximum Ratings

• Supply voltage	V_{DD}	$V_{SS} - 0.5$ to $+4.6$	V
	AV_{DD}	$V_{SS} - 0.5$ to $+4.6$	V
• Input voltage	V_I	$V_{SS} - 0.5$ to $V_{DD} + 0.5$	V
• Output voltage	V_O	$V_{SS} - 0.5$ to $V_{DD} + 0.5$	V
• Operating temperature	T_{opr}	-20 to $+75$	°C
	T_{stg}	-55 to $+150$	°C



Recommended Operating Conditions

- Supply voltage

V_{DD}	3.0 to 3.6	V
AV_{DD} (AVD1, 2, 5, 6)	3.0 to 3.6	V
AV_{DD} (AVD4)	3.0 to 5.5	V
- Operating temperature

T_{opr}	-20 to $+75$	°C
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Applications

- Industrial CCD cameras
(surveillance/FA/image input cameras)
- Multimedia CCD cameras
(teleconferencing/personal computer cameras)

Applicable CCD Image Sensors*

510H color CCDs (Type 1/3, 1/4, 1/6 NTSC/PAL)

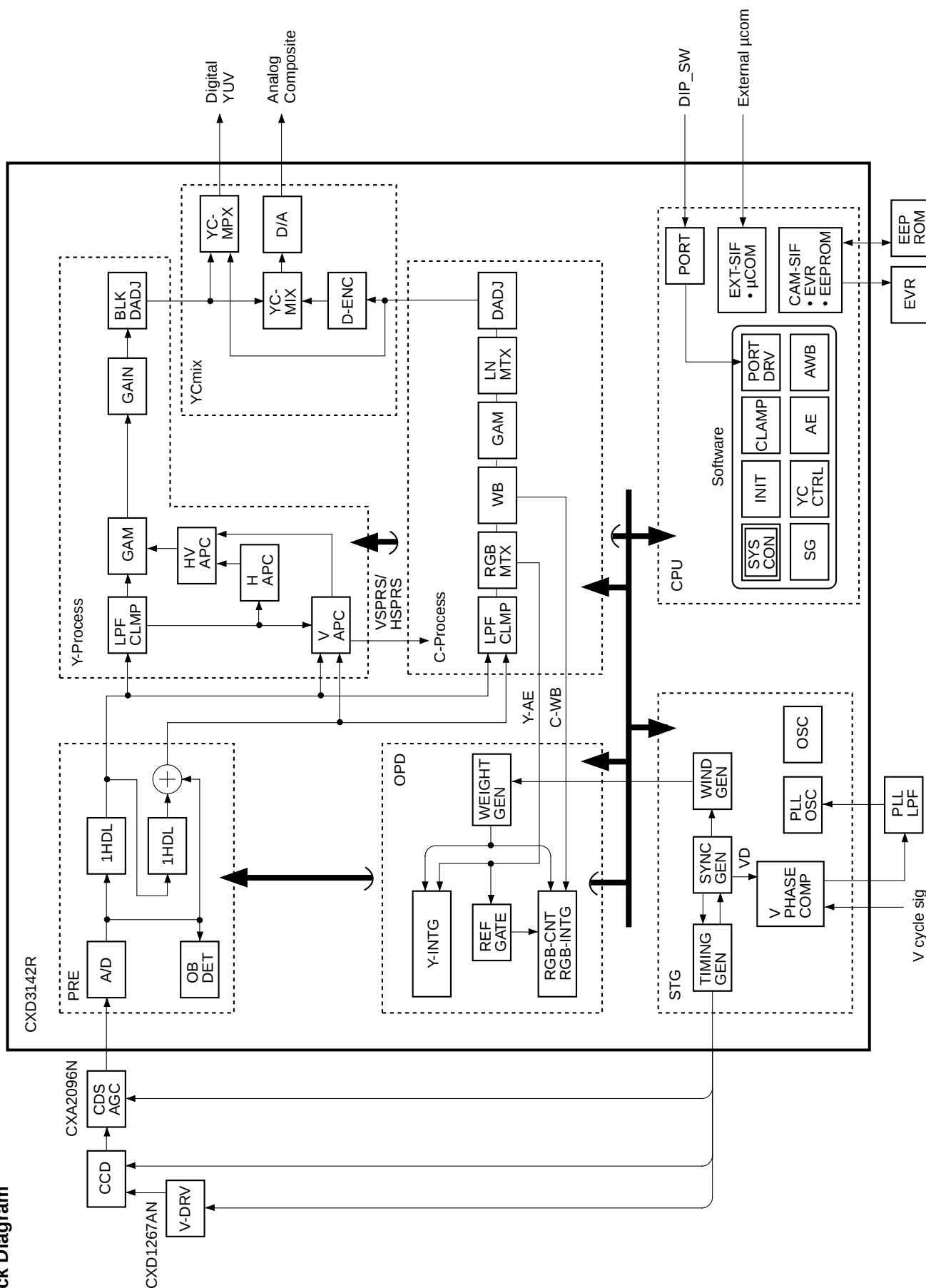
Supported Relates LSIs

V-Driver: CXD1267AN
 AGC: CXA2096N
 EVR: MB88347 (Fujitsu Limited.)
 EEPROM: CAT64LC40JI
 (Catalyst Semiconductor Inc.)
 AK6420
 (Asahi Kasei Microsystems Co.,Ltd.)

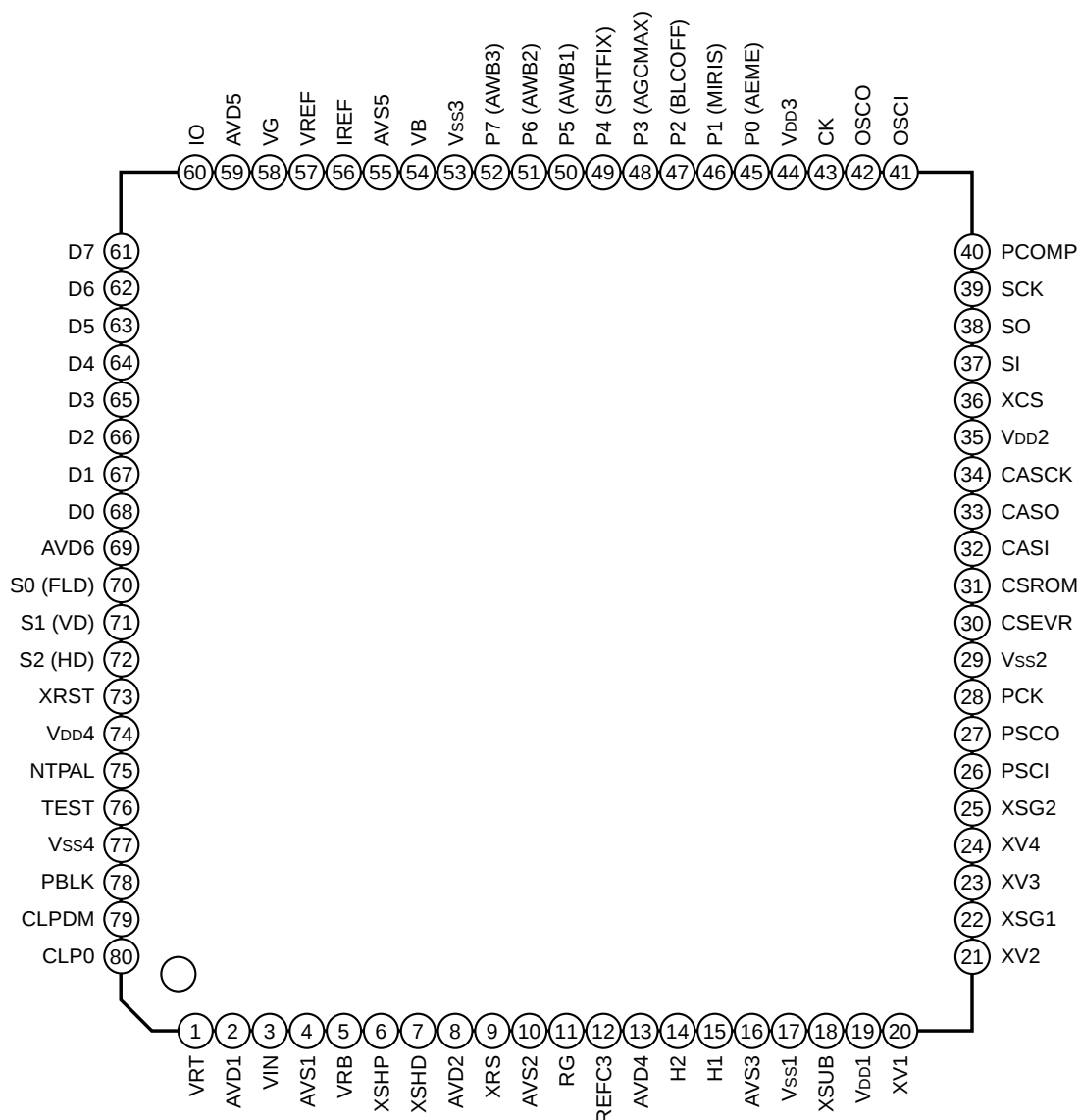
* Applicable CCD Image Sensors are applicable products as of preparing this data sheet.
 They may be changed according to the version up and production stop of CCD image sensor.

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Block Diagram



Pin Configuration



Note) Symbols in parentheses are the signal names when the LSI is switched by the serial communication settings.

All pin symbols (pin names) for the CXD3142R are the names next to the pin No. (outside the parentheses).

Pin Description

Pin No.	Symbol	I/O	Description		Power supply
1	VRT	I (A)	A/D converter reference voltage (top) input.	A/D	AVD1
2	AVD1	—	Power supply for A/D converter. (+3.3V)		
3	VIN	I (A)	A/D converter analog signal input.		
4	AVS1	—	GND		
5	VRB	I (A)	A/D converter reference voltage (bottom) input.	S/H	AVD2
6	XSHP	O	Precharge level sample-and-hold pulse output.		
7	XSHD	O	Data sample-and-hold pulse output.		
8	AVD2	—	Power supply for sample-and-hold pulse driver. (+3.3V)		
9	XRS	O	Resampling pulse output.	CCD	AVD4
10	AVS2	—	GND		
11	RG	O	Reset gate pulse output.		
12	REFC3	I	Reference capacitor connection pin.		
13	AVD4	—	Power supply for H driver. (+3.3V/+5.0V)	OSC2	V _{DD}
14	H2	O	CCD horizontal register transfer pulse output.		
15	H1	O	CCD horizontal register transfer pulse output.		
16	AVS3	—	GND		
17	V _{SS} 1	—	GND	Peripheral communication	
18	XSUB	O	CCD electronic shutter pulse output.		
19	V _{DD} 1	—	Power supply for Logic. (+3.3V)		
20	XV1	O	CCD vertical register transfer pulse output.		
21	XV2	O	CCD vertical register transfer pulse output.		
22	XSG1	O	CCD sensor readout pulse output.		
23	XV3	O	CCD vertical register transfer pulse output.		
24	XV4	O	CCD vertical register transfer pulse output.		
25	XSG2	O	CCD sensor readout pulse output.		
26	PSCI	I	Oscillation cell input. (slave)		
27	PSCO	O	Oscillation cell output. (slave)		
28	PCK	I	System clock input. (slave)		
29	V _{SS} 2	—	GND		
30	CSEVR	O	Chip select output for camera peripheral ICs. (to EVR)		
31	CSROM	O	Chip select output for camera peripheral ICs. (to EEPROM)		
32	CASI	I	Serial data input for camera peripheral ICs. (from EEPROM)		
33	CASO	O	Serial data output for camera peripheral ICs. (to EVR, EEPROM)		
34	CASCK	O	Serial clock output for camera peripheral ICs. (to EVR, EEPROM)		
35	V _{DD} 2	—	Power supply for Logic. (+3.3V)		

Pin No.	Symbol	I/O	Description		Power supply	
36	XCS	I	Chip select input for microcomputer communication.	External communication	V _{DD}	
37	SI	I	Serial data input for microcomputer communication.			
38	SO	O	Serial data output for microcomputer communication.			
39	SCK	I	Serial clock input for microcomputer communication.			
40	PCOMP	O/Z	Phase comparator output for PLL.			
41	OSCI	I	Oscillation cell input. (master)	OSC1		
42	OSCO	O	Oscillation cell output. (master)			
43	CK	I	System clock input. (master)			
44	V _{DD3}	—	Power supply for Logic. (+3.3V)			
45	P0 (AEME)	I	Port 0 input for mode switch. (AE mode switching)	SW		
46	P1 (MIRIS)	I	Port 1 input for mode switch. (Iris mode switching)			
47	P2 (BL COFF)	I	Port 2 input for mode switch. (Backlight compensation off)			
48	P3 (AGCMAX)	I	Port 3 input for mode switch. (AGC maximum gain switching)			
49	P4 (SHTFIX)	I	Port 4 input for mode switch. (SHUT FIX mode switching)			
50	P5 (AWB1)	I	Port 5 input for mode switch. (AWB mode switching)			
51	P6 (AWB2)	I	Port 6 input for mode switch. (ATW/push lock switching)			
52	P7 (AWB3)	I	Port 7 input for mode switch. (Push lock signal input)			
53	V _{ss3}	—	GND			
54	VB	I (A)	Capacitor connection pin. (about 0.1μF)	D/A	AVD5	
55	AVS5	—	GND			
56	IREF	O (A)	Reference current setting pin.			
57	VREF	I (A)	Reference voltage setting pin.			
58	VG	I (A)	Capacitor connection pin. (about 0.1μF)			
59	AVD5	—	Power supply for D/A converter. (+3.3V)			
60	IO	O	Composite signal (current) output.			
61	D7	O/Z	Digital signal output.	Digital output	V _{DD}	
62	D6	O/Z	Digital signal output.			
63	D5	O/Z	Digital signal output.			
64	D4	O/Z	Digital signal output.			
65	D3	O/Z	Digital signal output.			
66	D2	O/Z	Digital signal output.			
67	D1	O/Z	Digital signal output.			
68	D0	O/Z	Digital signal output.			
69	AVD6	—	Power supply for A/D converter. (+3.3V)			

Pin No.	Symbol	I/O	Description		Power supply
70	S0 (FLD)	O/Z	Sync signal output 0. (FLD signal)	Sync signal	V _{DD}
71	S1 (VD)	O/I/Z	Sync signal output 1. (VD signal)/VD signal input for LL		
72	S2 (HD)	O/Z	Sync signal output 2. (HD signal)		
73	XRST	I	Reset input. (Low: reset, High: normal operation)		
74	V _{DD} 4	—	Power supply for Logic. (+3.3V)		
75	NTPAL	I	TV mode switching. (Low: NTSC, High: PAL)		
76	TEST	I	Chip test input. Low fixed at normal operation.		
77	V _{SS} 4	—	GND		
78	PBLK	O	Preblanking pulse output.	S/H	
79	CLPDM	O	Dummy data clamp pulse output.		
80	CLP0	O	Optical black clamp pulse output.		

I: CMOS level input

O: CMOS level output

I/O: Bidirectional input/output

O/Z: Tri-state output

I (A): Analog input

O (A): Analog output

O/I/Z: Bidirectional input/output with Tri-state

Electrical Characteristics

DC Characteristics

(Within recommended operating range)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage	V_{DD1} , 2, 3, 4		3.0	3.3	3.6	V
	$AVD1$, 2, 6		3.0	3.3	3.6	V
	$AVD5$	D/A output amplitude = 1Vp-p	3.0	3.3	3.6	V
	$AVD4$		3.0	—	5.5	V
Output voltage	V_{OH1}^{*1}	$I_{OH} = 4\text{mA}$	$V_{DD} - 0.4$			V
	V_{OL1}^{*1}	$I_{OL} = 4\text{mA}$			0.4	V
	$V_{OH2}^{*2, *6}$	$I_{OH} = 1\text{mA}$	$V_{DD} - 0.4$			V
	$V_{OL2}^{*2, *6}$	$I_{OL} = 1\text{mA}$			0.4	V
Input voltage	$V_{T+}^{*2, *3, *4, *5}$		$0.7V_{DD}$			V
	$V_{T-}^{*2, *3, *4, *5}$				$0.2V_{DD}$	V
Hysteresis	$V_{T+} - V_{T-}^{*2, *3, *5}$			0.5		V
Input leak current	I_{IH}^{*7}	$V_{IN} = V_{DD}$	40	100	240	μA

*1 XV1, XV2, XV3, XV4, XSG1, XSG2, XSUB, PBLK, CLPDM, CLP0, SO, CASCK, CASO, CSROM, CSEVR

*2 S1

*3 XRST, XCS, SI, SCK, CASI

*4 NTPAL

*5 P0, P1, P2, P3, P4, P5, P6, P7

*6 S0, S2, D0, D1, D2, D3, D4, D5, D6, D7

*7 TEST

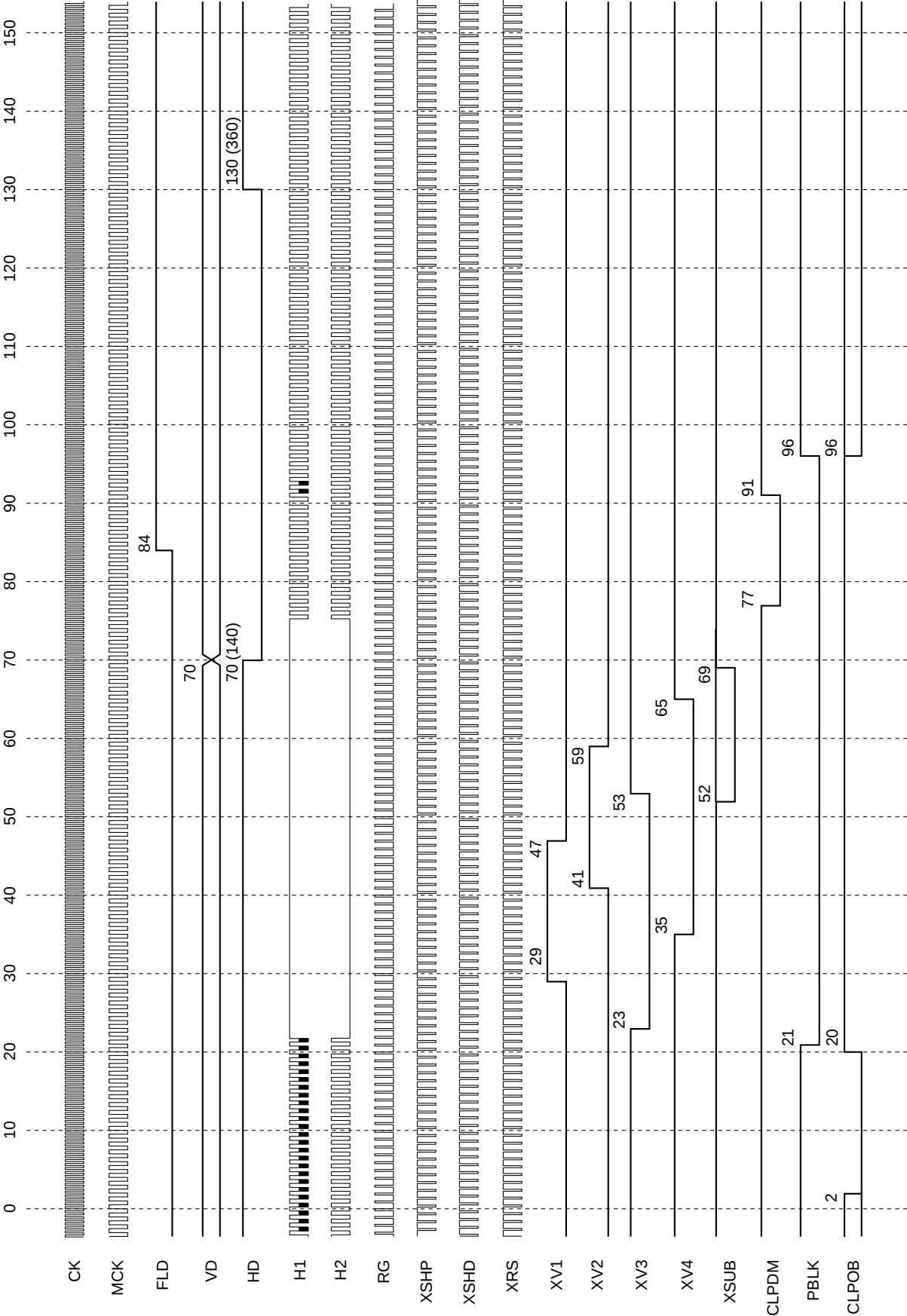
I/O Pin Capacitance

 $(V_{DD} = V_I = 0\text{V}, f = 1\text{MHz})$

Item	Symbol	Min.	Typ.	Max.	Unit
Input pin capacitance	C_{IN}			9	pF
Output pin capacitance	C_{OUT}			11	pF
I/O pin capacitance	$C_{I/O}$			11	pF

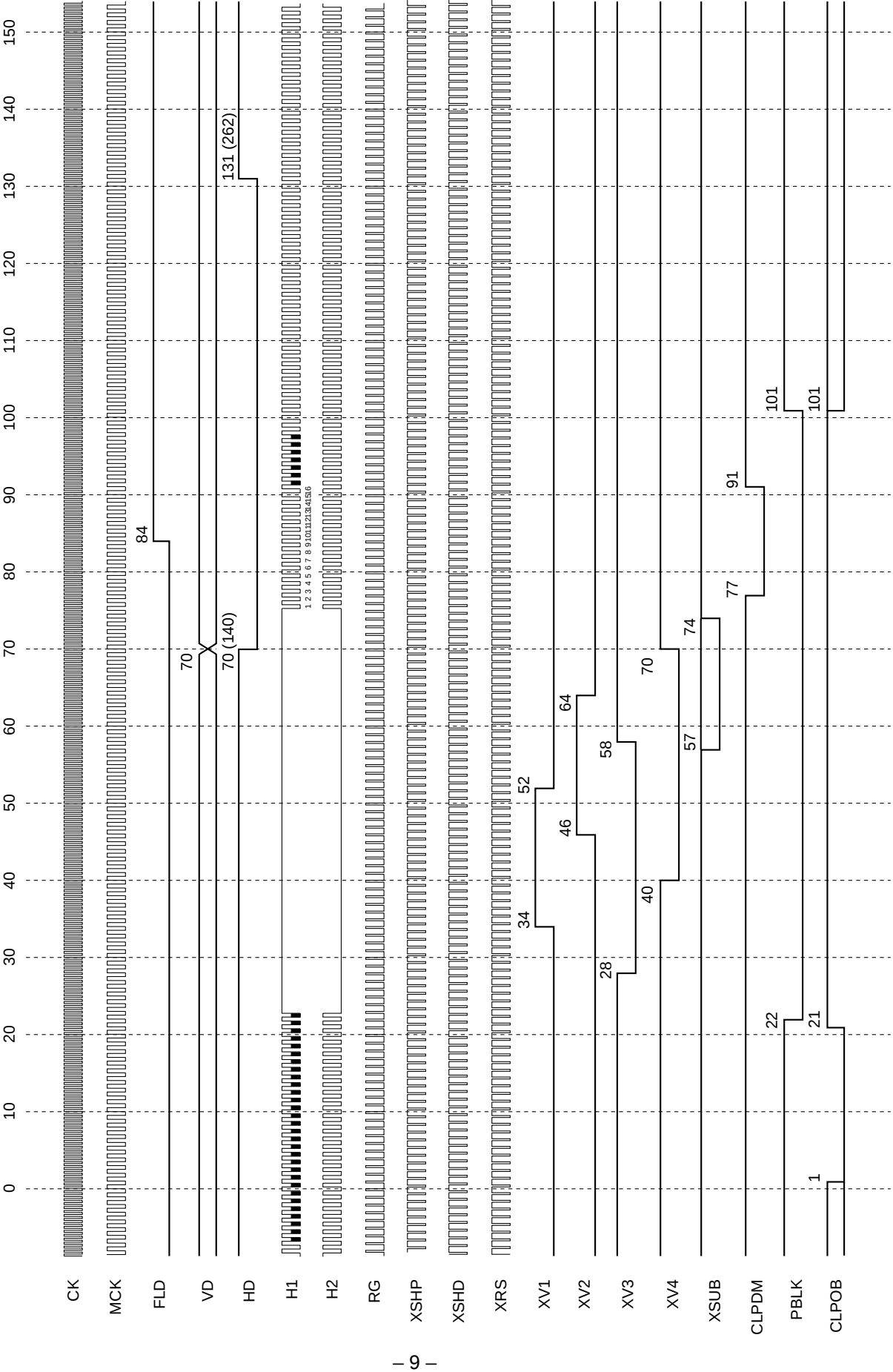
510H NTSC Horizontal Timing Chart

CK: 1212f_H (19.06993MHz/52.44ns)
MCK: 606f_H (9.53496MHz/104.88ns)



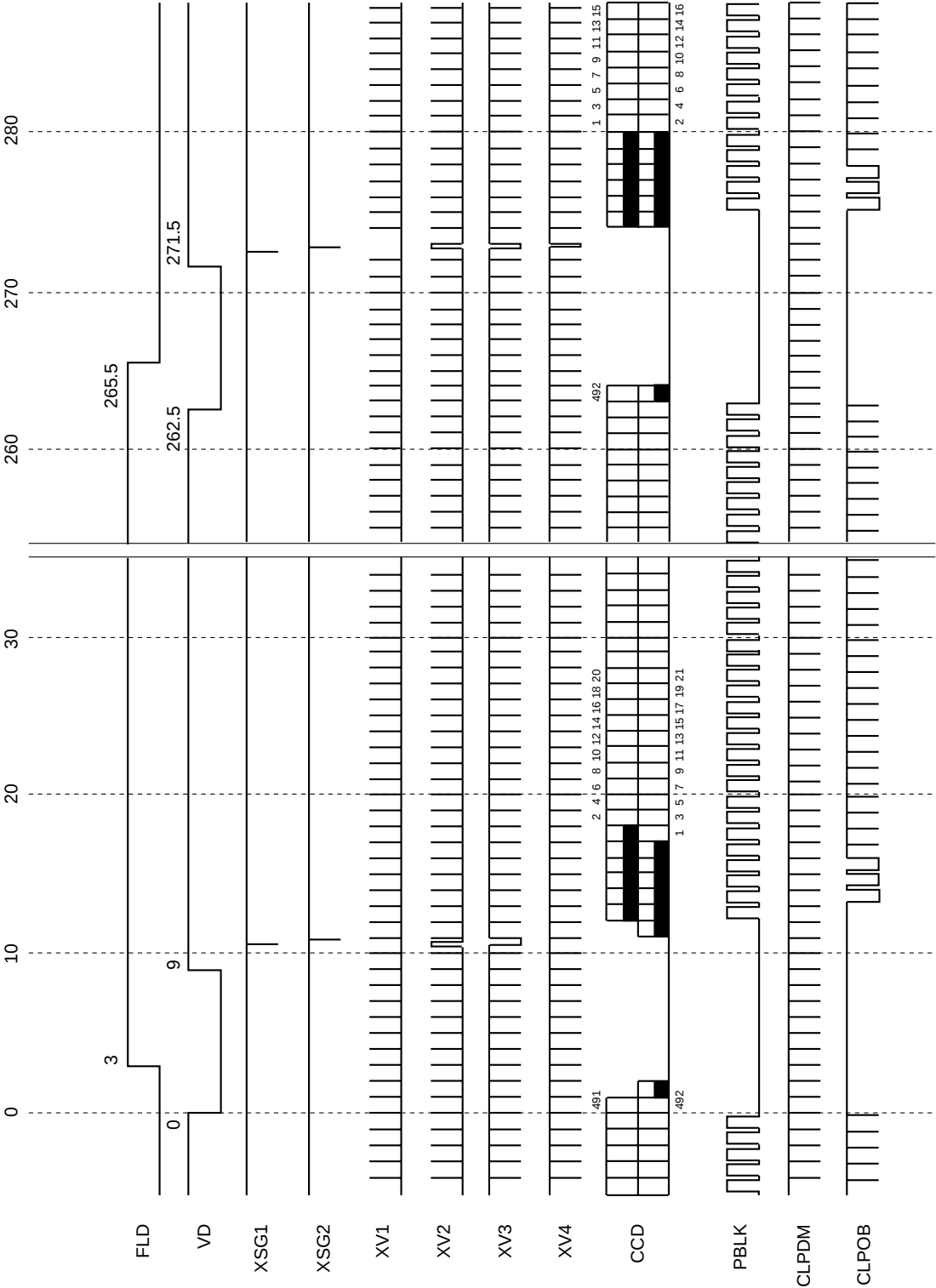
510 PAL Horizontal Timing Chart

CK: 1212f_H (18.9375MHz/52.81ns)
MCK: 606f_H (9.46875MHz/105.61ns)



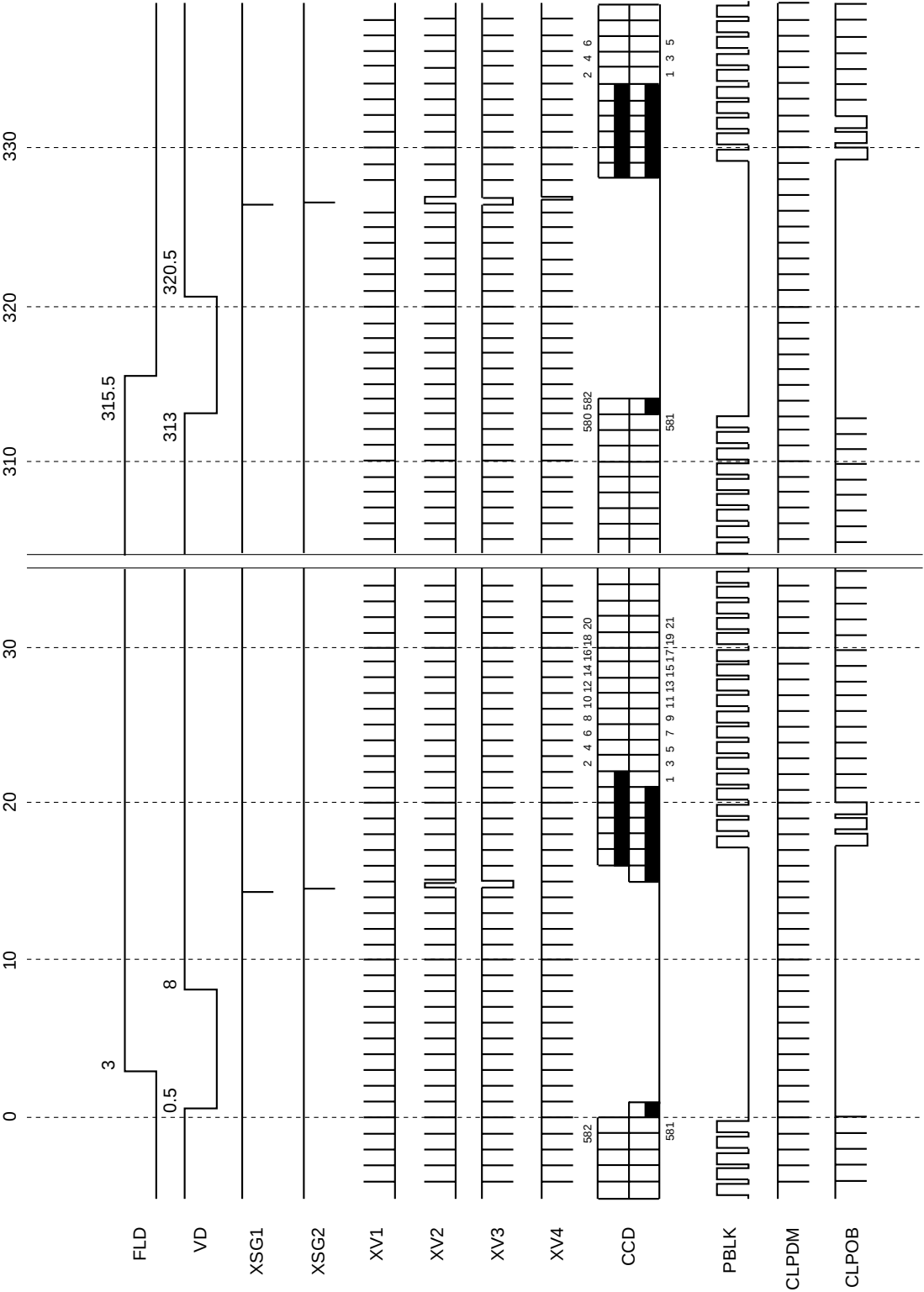
CK: 1212fH (19.06993MHz/52.44ns)
MCK: 606fH (9.53496MHz/104.88ns)

510H NTSC Vertical Timing Chart



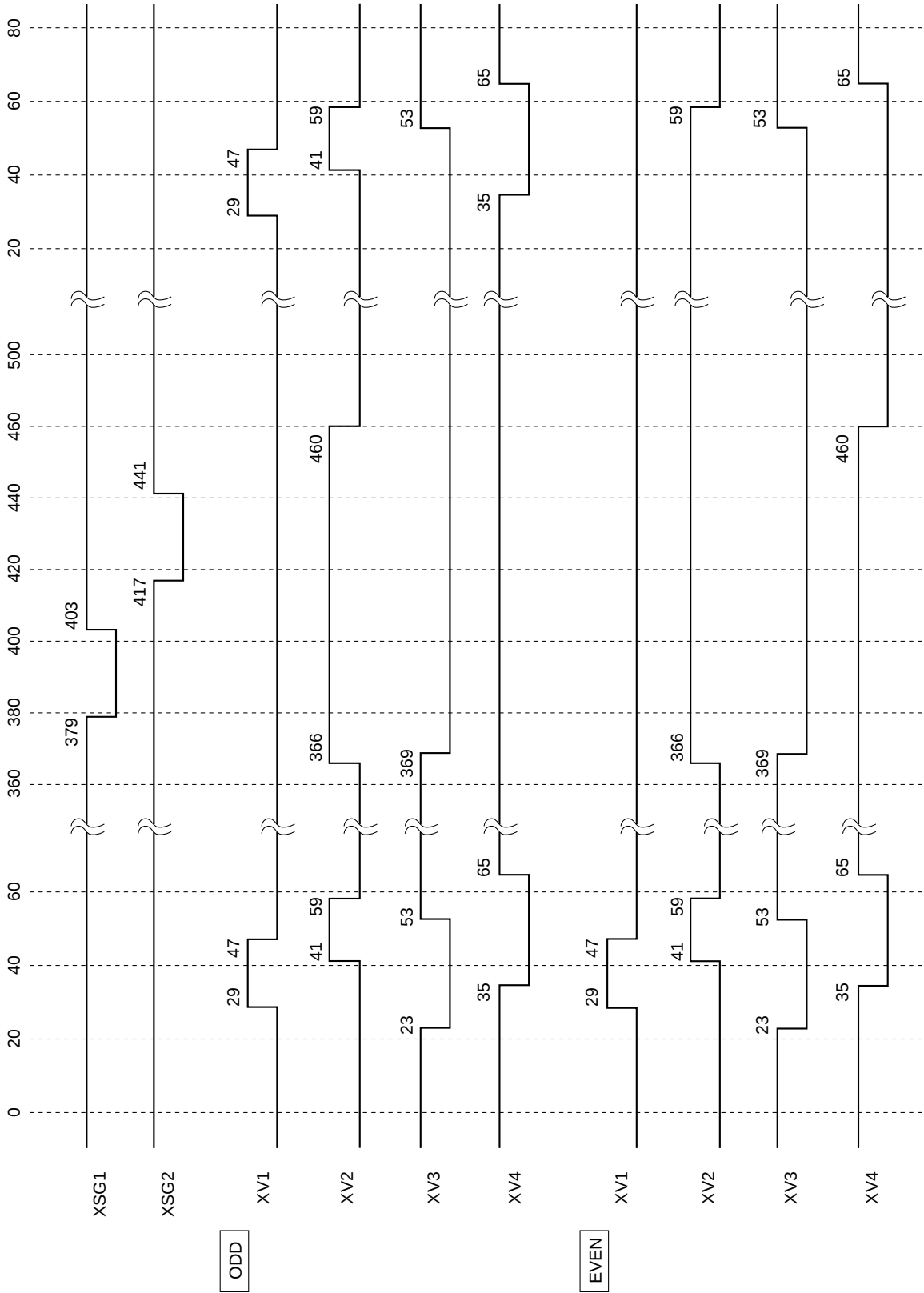
CK: 1212f_H (18.9375MHz/52.81ns)
MCK: 606f_H (9.46875MHz/105.61ns)

510H PAL Vertical Timing Chart



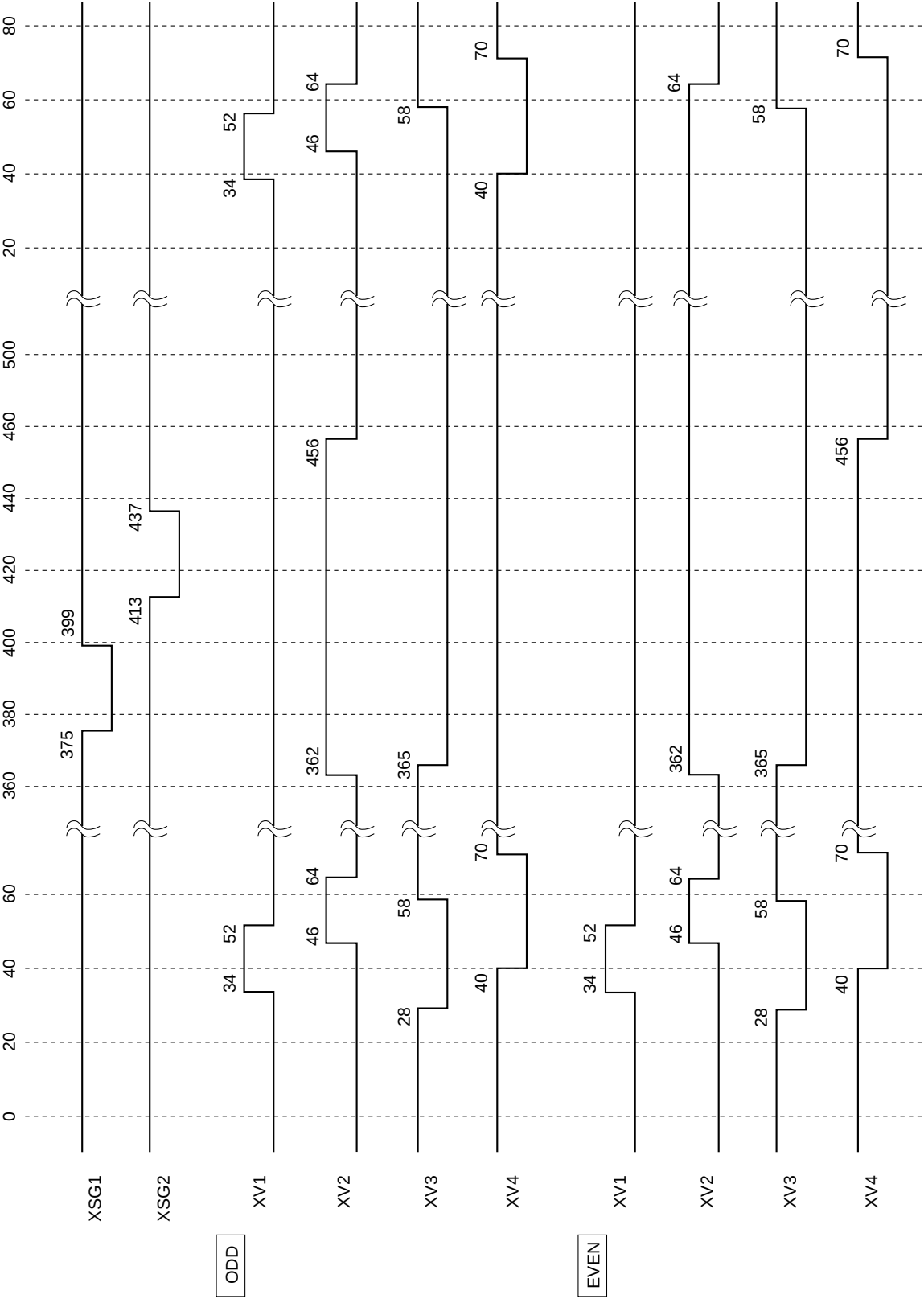
510H NTSC Readout Timing Chart

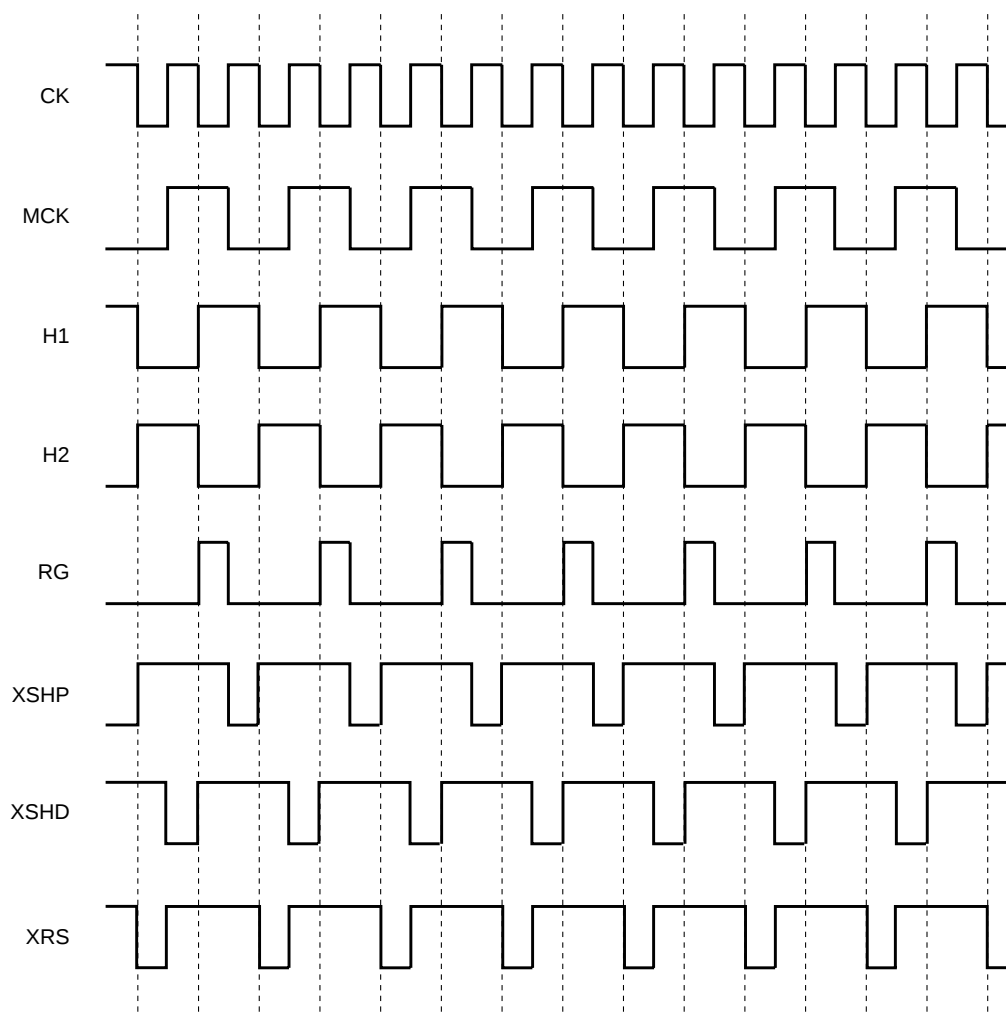
CK: 1212fH (19.06993MHz/52.44ns)
MCK: 606fH (9.53496MHz/104.88ns)



CK: 1212f_H (18.9375MHz/52.81ns)
MCK: 606f_H (9.46875MHz/105.61ns)

510H PAL Readout Timing Chart



510H High-speed Clock Timing chart

Serial Communication Data

Classification of Serial Data

Category	Contents		
	I/O	Byte 0	Byte 1 to
CAT1: SYSCON	I	01h	System configuration
CAT2: CPU	I	02h	CPU configuration
CAT3: PICT	I	03h	Picture parameters
CAT4: AE	I	04h	AE usr specification
CAT5: AWB	I	05h	AWB usr specification
CAT6: ADJUST	I	06h	Adjustment
CAT7: TIMING	I	07h	Timing parameters
CAT8: SOUT	I	08h	Serial OUT setting
	O		Serial OUT data
CAT9: EXTCON	I	09h	External controller

Category 1: SYSCON

CAT1		Serial input					
Byte	bit	Name	Description	#1	Block	Address	
0	0	CAT1	LSB	Category select code 01h: SYSCON			
	1						
	2						
	3						
	4						
	5						
	6						
	7		MSB				
1	0	NTPAL	NTSC/PAL 0: NTSC, 1: PAL	0	common	01h	
	1	OCCF	On-chip color filter 0: Type 1/4, 1: Type 1/3	0	MAIN/C		
	2	(Low)	LSB	"0" fixed	0		common
	3		MSB				
	4	OUTMODE	LSB	0x: Analog 1x: Analog and Digital	1		common
	5		MSB				
	6	(Low)	"0" fixed	0	Y/C		
	7	(Low)	"0" fixed	0			
2	0	DLYH	LSB Delay Adjustment for H1, H2	0h	STG	02h	
	1		MSB 0h: +0ns, 1h: +4ns, 2h: +7ns, 3h: −8ns				
	2	DTYH	LSB Duty Adjustment for H1, H2	0h			
	3		MSB 0h: Norm, 1h: F + 3ns, 2h: F + 6ns, 3h: R + 3ns				
	4	DLYRG	LSB Delay Adjustment for RG	0h			
	5		MSB 0h: +0ns, 1h: +4ns, 2h: +7ns, 3h: −8ns				
	6	DTYRG	LSB Duty Adjustment for RG	0h			
	7		MSB 0h: Norm, 1h: F + 3ns, 2h: F + 6ns, 3h: R + 3ns				
3	0	IRLESS	IR less mode 1: ON	0	AWB/MAIN	03h	
	1	VIDEOAE	Video AE mode 1: ON	1	AE/MAIN		
	2	ADCKSEL	LSB ADCK Phase Adjustment	0h	STG		
	3		MSB 0h: +0Tck, 1h: +1/4Tck, 2h: +2/4Tck, 3h: +3/4Tck				
	4	(Low)	"0" fixed	0			
	5						
	6	OPBCKINV	Clock Invert for 1st FF after ADC 0: Norm, 1: INV	0	PRE		
	7	(Low)	"0" fixed	0			

#1: Initial setting value with Power-on

CAT1		Serial input				
Byte	bit	Name	Description	#1	Block	Address
4	0	(Low)	"0" fixed	0		04h
	1	(Low)	"0" fixed	0		
	2	(Low)	"0" fixed	0		
	3	(Low)	"0" fixed	0		
	4					
	5	S2DLY	LSB Delay Adjustment for S2 MSB 0h: +0ns, 1h: +15ns, 2h: +30ns, 3h: +45ns	0h	TOP	
	6					
7	(Low)	"0" fixed	0			
5	0	(Low)	"0" fixed	0		05h
	1					
	2					
	3					
	4					
	5					
	6					
7	SPINSW	S0, 1, 2 pin active SW 0: Active, 1: Hi-Z	0	TOP		
6	0	ESMODE	Ext Sync mode 0: INT, 1: LL	0	TOP/STG	06h
	1	(Low)	"0" fixed	0		
	2	CMPMODE	P-COMP MODE 0: Norm 1: VCOMP mode (pin release)	0	TOP/STG	
	3	(Low)	"0" fixed	0		
	4	CMPINV	P-COMP ref/var INVerse 0: Normal, 1: Inverse	0	STG	
	5	(Low)	"0" fixed	0		
	6					
7						
7	0	S0SEL	LSB S0 pin select 0h: FLD, 1h: SYNC, 2h: BF, 3h: DISP MSB 4h: VD, 5h: HD, 6h: CBLK, 7h: DBLK	0h	TOP/STG	07h
	1					
	2					
	3	SSHIFT	Sync SHIFT (shiftVD/HD) 1: Select shiftVD	0	STG	
	4	S1SEL	LSB S1 pin select 00: VD, 01: FLD, 10: HD, 11: DISP MSB ESMODE = LL: S1 = AC in	0h	STG	
	5					
	6	S2SEL	LSB S2 pin select MSB 00: HD, 01: FLD, 10: VD, 11: DISP	0h	STG	
7						

#1: Initial setting value with Power-on

Category 2: CPU

CAT2		Serial input				
Byte	bit	Name	Description	#1	Block	Address
0	0	CAT2	LSB			
	1					
	2					
	3					
	4		Category select code			
	5		02h: CPU			
	6					
	7		MSB			
1	0	CPUCMD	LSB	0h	MAIN	
	1					
	2					
	3					
	4		CPU Command (EEPROM, AECMD, AWBCMD)			
	5					
	6					
	7		MSB			
2	0	CPUADRS	LSB	0h	MAIN	
	1					
	2					
	3					
	4		CPU Address			
	5					
	6					
	7		MSB			
3	0	CPUDATA	LSB	0h	MAIN	
	1					
	2					
	3					
	4		CPU Data			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT2		Serial input				
Byte	bit	Name	Description	#1	Block	Address
4	0	CPUEXT	0: CPU, 1: EXT micon mode	0	MAIN	
	1	CPUAE	0: CPU, 1: AE hold (stop)	0		
	2	CPUAWB	0: CPU, 1: AWB hold (stop)	0		
	3	CPUSPRS	0: CPU, 1: SPRS hold (stop)	0		
	4	CPUDIP	0: CPU, 1: Ext Dip SW OFF	0		
	5	CPUSG	0: CPU, 1: SFT UP/DOWN Function OFF	0		
	6	—				
	7					
5	0	NORMFL	Normal FL (AGC + SHT) SW 1: ON	1	MAIN	08h
	1	LIMFL	LIMIT FL SW 1: ON	0		
	2	SFIXFL	Shutter FIX FL Control 1: ON	0		
	3	LAEFL1	Link AE FL1 (NORMFL) Control 1: ON	0		
	4	LAEFL2	Link AE FL2 (LIMFL) Control 1: ON	0		
	5	(Low)	"0" fixed	0		
	6	LAWBFL	Link AWB FL Control 1: ON	0		
	7	(Low)	"0" fixed	0		
6	0	AEME	Auto/Manual Exposure 0: Auto, 1: Normal	0	AE	09h
	1	MIRIS	Mechanical IRIS	0		
	2	BLCOFF	BackLight OFF	0		
	3	AEREF	AE REfERENCE up	0		
	4	AGCMAX	AGC MAX gain	0		
	5	SHTFIX	Shutter Fix (1/100)	0		
	6	AESHUT	AE Shutter mode	0		
	7	—				
7	0	AWB	LSB AWB mode 0h: ATW, 1h: IN, 2h: PUSH, 3h: USR, MSB 4h: —, 5h: FL, 6h: HOLD, 7h: OUT	0h	AWB	0Ah
	1					
	2					
	3	—				
	4	(Low)	"0" fixed	0		
	5	SFTUP	Shift UP	0	MAIN	
	6	SFTDWN	Shift DOWN	0	MAIN	
	7	—				

#1: Initial setting value with Power-on

CAT2		Serial input				
Byte	bit	Name	Description	#1	Block	Address
8	0	P0CB	LSB	46h	MAIN	0Bh
	1					
	2					
	3					
	4		Port 0 Cat/Byte			
	5					
	6					
	7		MSB			
9	0	P0M	LSB	00h	MAIN	0Ch
	1					
	2					
	3					
	4		Port 0 Mode			
	5					
	6					
	7		MSB			
10	0	P1CB	LSB	46h	MAIN	0Dh
	1					
	2					
	3					
	4		Port 1 Cat/Byte			
	5					
	6					
	7		MSB			
11	0	P1M	LSB	01h	MAIN	0Eh
	1					
	2					
	3					
	4		Port 1 Mode			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT2		Serial input				
Byte	bit	Name	Description	#1	Block	Address
12	0	P2CB	LSB	46h	MAIN	0Fh
	1					
	2					
	3					
	4		Port 2 Cat/Byte			
	5					
	6					
	7		MSB			
13	0	P2M	LSB	02h	MAIN	10h
	1					
	2					
	3					
	4		Port 2 Mode			
	5					
	6					
	7		MSB			
14	0	P3CB	LSB	46h	MAIN	11h
	1					
	2					
	3					
	4		Port 3 Cat/Byte			
	5					
	6					
	7		MSB			
15	0	P3M	LSB	04h	MAIN	12h
	1					
	2					
	3					
	4		Port 3 Mode			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT2		Serial input				
Byte	bit	Name	Description	#1	Block	Address
16	0	P4CB	LSB	46h	MAIN	13h
	1					
	2					
	3					
	4		Port 4 Cat/Byte			
	5					
	6					
	7		MSB			
17	0	P4M	LSB	05h	MAIN	14h
	1					
	2					
	3					
	4		Port 4 Mode			
	5					
	6					
	7		MSB			
18	0	P5CB	LSB	47h	MAIN	15h
	1					
	2					
	3					
	4		Port 5 Cat/Byte			
	5					
	6					
	7		MSB			
19	0	P5M	LSB	00h	MAIN	16h
	1					
	2					
	3					
	4		Port 5 Mode			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT2		Serial input				
Byte	bit	Name	Description	#1	Block	Address
20	0	P6CB	LSB	47h	MAIN	17h
	1					
	2					
	3					
	4		Port 6 Cat/Byte			
	5					
	6					
	7		MSB			
21	0	P6M	LSB	01h	MAIN	18h
	1					
	2					
	3					
	4		Port 6 Mode			
	5					
	6					
	7		MSB			
22	0	P7CB	LSB	47h	MAIN	19h
	1					
	2					
	3					
	4		Port 7 Cat/Byte			
	5					
	6					
	7		MSB			
23	0	P7M	LSB	02h	MAIN	1Ah
	1					
	2					
	3					
	4		Port 7 Mode			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

Category 3: PICT

CAT3		Serial input				
Byte	bit	Name	Description	#1	Block	Address
0	0	CAT3	LSB			
	1		Category select code 03h: PICT			
	2					
	3					
	4					
	5					
	6					
	7		MSB			
1	0	HAPGL	LSB	3h	Y	1Bh
	1		MSB			
	2	HAPGH	LSB	1h		
	3		MSB			
	4	YLPFSW	Y-LPF SW (on/off) 1: OFF	0		
	5	(Low)	"0" fixed	0		
	6	GAMSW	Y/C GAMMA SW (on/off) 1: OFF	0	Y/C/MAIN	
	7	—				
2	0	VAPG	LSB	Ah	Y	1Ch
	1		V Apcom Gain			
	2					
	3		MSB			
	4	VAPSL	LSB	2h		
	5		V Apcom Slice Level			
	6		MSB			
	7	(Low)	"0" fixed	0		
3	0	VHAPG	LSB	6h	Y	1Dh
	1		VH Apcom Gain			
	2					
	3		MSB			
	4	VHAPSL	LSB	4h		
	5		VH Apcom Slice Level			
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT3		Serial input				
Byte	bit	Name	Description	#1	Block	Address
4	0	ASPRSTA	LSB	A0h	MAIN	1Eh
	1					
	2					
	3					
	4		Apcom SUPPRESS START			
	5					
	6					
	7		MSB			
5	0	ASPREND	LSB	D0h	MAIN	1Fh
	1					
	2					
	3					
	4		Apcom SUPPRESS END			
	5					
	6					
	7		MSB			
6	0	ASPRLV	LSB	00h	MAIN	20h
	1					
	2					
	3					
	4		Apcom SUPPRESS LEVEL			
	5					
	6					
	7		MSB			
7	0	YGAIN	LSB	5Ah	Y	21h
	1					
	2					
	3					
	4		Y GAIN			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT3		Serial input					
Byte	bit	Name	Description	#1	Block	Address	
8	0	SETUP	LSB	Dh	Y	22h	
	1		SETUP level				
	2						
	3	MSB	5h				
	4	WCLIP		LSB			
	5			White CLIP level			
	6			MSB			
	7	(Low)	"0" fixed	0			
9	0	BSTLV	LSB	NT = 12h PAL = 13h	DENC	23h	
	1		Burst Level				
	2						
	3						
	4	MSB	1				
	5	BSTINV		Burst Inverse 0: Inverse, 1: Normal			
	6	(Low)		"0" fixed	0		
	7	MIRROR		Mirror SW 0: Normal, 1: Mirror	0		Y/C
10	0	RYGAIN	LSB	2Fh	C	24h	
	1		R-Y Gain				
	2						
	3						
	4						
	5						
	6						
	7		MSB				
11	0	BYGAIN	LSB	1Ch	C	25h	
	1		B-Y Gain				
	2						
	3						
	4						
	5						
	6						
	7		MSB				

#1: Initial setting value with Power-on

CAT3		Serial input				
Byte	bit	Name	Description	#1	Block	Address
12	0	RYHUE	LSB	FFh	C	26h
	1					
	2					
	3					
	4		R-Y HUE			
	5					
	6					
	7		MSB			
13	0	BYHUE	LSB	FEh	C	27h
	1					
	2					
	3					
	4		B-Y HUE			
	5					
	6					
	7		MSB			
14	0	CSPRSTA	LSB	A0h	MAIN	28h
	1					
	2					
	3					
	4		C SUPPRESS START			
	5					
	6					
	7		MSB			
15	0	CSPREND	LSB	D0h	MAIN	29h
	1					
	2					
	3					
	4		C SUPPRESS END			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT3		Serial input				
Byte	bit	Name	Description	#1	Block	Address
16	0	CSPRLV	LSB	8Ah	MAIN	2Ah
	1		C SUPPRESS LEVEL			
	2					
	3					
	4					
	5					
	6					
	7					
17	0	CSVLV	LSB	0h	C	2Bh
	1		MSB C Suppress V apcom Level			
	2	CSVTH	LSB	1h	Y	
	3		MSB C Suppress V apcom THreshold			
	4	CSHLV	LSB	0h	C	
	5		MSB C Suppress Highlight Level			
	6	CSHTH	LSB	2h	Y	
	7		MSB C Suppress Highlight Threshold			
18	0	YSPRLV	LSB	0h	Y/(C)	2Ch
	1		MSB Y Suppress Highlight Level			
	2	YSPRTH	LSB	0h	Y/(C)	
	3		MSB Y Suppress Highlight Threshold			
	4	HLLIM	LSB	0h	DENC	
	5		MSB Highlight LIMiter level			
	6	PEDLIM	LSB	0h	DENC	
	7		MSB PEDestal LIMiter level			
19	0	GOFGAIN	LSB	00h	MAIN	2Dh
	1		Gamma OFF Y/C GAIN			
	2					
	3					
	4					
	5					
	6					
	7					

#1: Initial setting value with Power-on

Category 4: AE

CAT4		Serial input				
Byte	bit	Name	Description	#1	Block	Address
0	0	CAT4	LSB			
	1		Category select code 04h: AE			
	2					
	3					
	4					
	5					
	6					
	7		MSB			
1	0	AEW0	LSB AE Wind0 weight	0h	OPD	2Fh
	1		MSB			
	2	AEW1	LSB AE Wind1 weight	0h		
	3		MSB			
	4	AEW2	LSB AE Wind2 weight	0h		
	5		MSB			
	6	AEW3	LSB AE Wind3 weight	0h		
	7		MSB			
2	0	AGCFL	AGC FL	0	AE	30h
	1	SHTFL	Shutter FL	0		
	2	LSHTLIM	Low speed Shut Lim 0: Normal, 1: Limit ON	0		
	3	(Low)	"0" fixed	0		
	4	EVR5V	EVR voltage select 0: 3.3V, 1: 5V	0		
	5	—				
	6					
	7	(Low)	"0" fixed	0		
3	0	AESTAB	LSB	0h	AE	31h
	1		AE Stability			
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT4		Serial input				
Byte	bit	Name	Description	#1	Block	Address
4	0	AEHYST	LSB	0h	AE	32h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
5	0	AEWAIT	LSB	0h	AE	33h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
6	0	AESPEED	LSB	08h	AE	34h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
7	0	AEUSR	LSB	04h	AE	35h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT4		Serial input				
Byte	bit	Name	Description	#1	Block	Address
8	0	AGCMAXL	LSB	CCh	AE	36h
	1					
	2					
	3					
	4		AE AGC MAX Low (AGCMAX = 0)			
	5					
	6					
	7		MSB			
9	0	AGCMAXH	LSB	FFh	AE	37h
	1					
	2					
	3					
	4		AE AGC MAX High (AGCMAX = 1)			
	5					
	6					
	7		MSB			
10	0	MSHTLIM	LSB	7h	AE	38h
	1					
	2					
	3					
	4		AE MAX speed shut Lim			
	5					
	6					
	7		MSB			
11	0	AGCFLLL	LSB	20h	AE	39h
	1					
	2					
	3					
	4		AE AGC FL lower Lim			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT4		Serial input					
Byte	bit	Name	Description	#1	Block	Address	
12	0	SHTFLLL	LSB	1h	AE	3Ah	
	1		AE SHUTTER FL Lower Lim				
	2						
	3		MSB				
	4	SHTFLUL	LSB	Bh			
	5		AE SHUTTER FL Upper Lim				
	6						
	7		MSB				
13	0	AETHL	LSB	10h	AE	3Bh	
	1		AE THRESHOLD Low				
	2						
	3						
	4						
	5						
	6						
	7		MSB				
14	0	AETHH	LSB	20h	AE	3Ch	
	1		AE THRESHOLD High				
	2						
	3						
	4						
	5						
	6						
	7		MSB				

#1: Initial setting value with Power-on

Category 5: AWB

CAT5		Serial input						
Byte	bit	Name	Description	#1	Block	Address		
0	0	CAT5	LSB					
	1		Category select code 05h: AWB					
	2							
	3							
	4							
	5							
	6							
	7		MSB					
1	0	AWBW0	LSB	0h	OPD	3Dh		
	1		MSB				AWB Wind0 weight	
	2	AWBW1	LSB	0h				
	3		MSB				AWB Wind1 weight	
	4	AWBW2	LSB	0h				
	5		MSB				AWB Wind2 weight	
	6	AWBW3	LSB	0h				
	7		MSB				AWB Wind3 weight	
2	0	AWBSEPOF	AWB light SEParate OFF	0h	AWB	3Eh		
	1	AWBTRIG	AWB TRIGger ON/OFF	0h				
	2	AWBHLCUT	LSB	0h				
	3		MSB				AWB High Light CUT block	
	4	AWBLLCUT	AWB Low Light integ data CUT	0h				
	5	—						
	6							
	7							
3	0	GGAIN	LSB	26h	AWB	3Fh		
	1		Green GAIN (push lock mode)					
	2							
	3							
	4							
	5							
	6							
	7		MSB					

#1: Initial setting value with Power-on

CAT5		Serial input						
Byte	bit	Name	Description	#1	Block	Address		
4	0	—						
	1							
	2							
	3							
	4							
	5							
	6							
	7							
5	0	AWBSPED	LSB	1h	AWB	41h		
	1		AWB SPEED (0: PUSH mode)					
	2							
	3	AWBAJST5	MSB	0h				
	4		LSB AWB Adjust5					
	5						MSB	
	6	AWBAJST6	LSB AWB Adjust6	0h				
	7		MSB					
6	0	AWBFRAM	LSB	00h	AWB	42h		
	1		AWB vector FRAME					
	2							
	3							
	4							
	5							
	6							
	7		MSB					
7	0	AWBRSFT	LSB	00h	AWB	43h		
	1		AWB ATW R shift					
	2							
	3							
	4							
	5							
	6							
	7		MSB					

#1: Initial setting value with Power-on

CAT5		Serial input				
Byte	bit	Name	Description	#1	Block	Address
8	0	AWBBSFT	LSB	00h	AWB	44h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
9	0	—				
	1					
	2					
	3					
	4					
	5					
	6					
	7					
10	0	—				
	1					
	2					
	3					
	4					
	5					
	6					
	7					
11	0	WBUSRR	LSB	49h	AWB	47h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT5		Serial input				
Byte	bit	Name	Description	#1	Block	Address
12	0	WBUSRB	LSB	2Ch	AWB	48h
	1		AWB USR mode B gain			
	2					
	3					
	4					
	5					
	6					
	7		MSB			
13	0	WBRST	LSB	3h	AWB	49h
	1		WB R shift			
	2					
	3					
	4					
	5					
	6					
	7		MSB			
14	0	WBBSFT	LSB	1h	AWB	4Ah
	1		WB B shift			
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

Category 6: ADJUST

CAT6		Serial input				
Byte	bit	Name	Description	#1	Block	Address
0	0	CAT6	LSB			
	1		Category select code 06h: ADJUST			
	2					
	3					
	4					
	5					
	6					
	7					
1	0	VSUB		LSB	00h	EVR3
	1		CCD: VSUB			
	2					
	3					
	4					
	5					
	6					
	7			MSB		
2	0	RGL		LSB	00h	EVR4
	1		CCD: RGL			
	2					
	3					
	4					
	5					
	6					
	7			MSB		
3	0	AGCMIN		LSB	11h	AE
	1		S/H: AGC MIN gain			
	2					
	3					
	4					
	5					
	6					
	7			MSB		

#1: Initial setting value with Power-on

CAT6		Serial input				
Byte	bit	Name	Description	#1	Block	Address
4	0	SHOFST	LSB	A0h	EVR5	4Eh
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
5	0	DAVRF	LSB	58h	EVR6	4Fh
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
6	0	EVRUSR7	LSB	00h	EVR7	50h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
7	0	EVRUSR8	LSB	00h	EVR8	51h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT6		Serial input				
Byte	bit	Name	Description	#1	Block	Address
8	0	AWBPRER	LSB	37h	AWB	52h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
9	0	AWBPRES	LSB	39h	AWB	53h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
10	0	PRERBL	LSB	00h	AWB	54h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
11	0	PRERBH	LSB	0Ah	AWB	55h
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT6		Serial input				
Byte	bit	Name	Description	#1	Block	Address
12	0	PRERBGL	LSB	00h	AWB	56h
	1					
	2					
	3					
	4		PRE R + B – 2G L			
	5					
	6					
	7		MSB			
13	0	PRERBGH	LSB	23h	AWB	57h
	1					
	2					
	3					
	4		PRE R + B – 2G H			
	5					
	6					
	7		MSB			
14	0	PRE2R	LSB	60h	AWB	58h
	1					
	2					
	3					
	4		AWB PRE WB2 R			
	5					
	6					
	7		MSB			
15	0	PRE2B	LSB	20h	AWB	59h
	1					
	2					
	3					
	4		AWB PRE WB2 B			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT6		Serial input				
Byte	bit	Name	Description	#1	Block	Address
16	0	AWBAJST1	LSB	18h	AWB	5Ah
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
17	0	AWBAJST2	LSB	1Ch	AWB	5Bh
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
18	0	AWBAJST3	LSB	00h	AWB	5Ch
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
19	0	AWBAJST4	LSB	00h	AWB	5Dh
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT6		Serial input				
Byte	bit	Name	Description	#1	Block	Address
20	0	BLOGAIN	LSB	46h	AWB	5Eh
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
21	0	INTSLICE	LSB	80h	AWB	5Fh
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

Category 7: TIMING

CAT7		Serial input								
Byte	bit	Name	Description	#1	Block	Address				
0	0	CAT7	LSB							
	1		Category select code 07h: TIMING							
	2									
	3									
	4									
	5									
	6									
	7		MSB							
1	0	WINDSEL	LSB	3h	OPD	61h				
	1		MSB				WIND/DISP SElect			
	2	WINDMK	WIND MarKer on1: ON	0	Y					
	3	DEFMK	DEFect 1, 2 MarKer on1: ON	0	DLY					
	4	SVHMK	SHIFT VD MarKer on1: ON	0	Y					
	5	—								
	6									
	7									
2	0	W3STAH	LSB	5h	STG	62h				
	1		Wind3 H START							
	2									
	3	MSB	5h							
	4	LSB								
	5	Wind3 H WIDTH								
	6									
	7	MSB								
3	0	W3STAV	LSB	4h	STG	63h				
	1		Wind3 V START							
	2									
	3	MSB	7h							
	4	LSB								
	5	Wind3 V WIDTH								
	6									
	7	MSB								

#1: Initial setting value with Power-on

CAT7		Serial input				
Byte	bit	Name	Description	#1	Block	Address
4	0	(Low)	"0" fixed	0		64h
	1					
	2					
	3					
	4	ADCKDLY	LSB MSB Delay Adjustment for ADCK	2h	STG	
	5					
	6	(Low)	"0" fixed	0		
7	OFFSET25	PAL 25Hz Offset 0: Normal, 1: 25Hz Offset	0	DENC		
5	0	DLYXSH	LSB Delay Adjustment for XSHP, XSHD MSB 0h: 0ns, 1h: +4ns, 2h: +7ns, 3h: −8ns	0h	STG	65h
	1					
	2	DTYXSH	LSB Duty Adjustment for XSHP, XSHD MSB 0h: Norm, 1h: F + 3ns, 2h: F + 6ns, 3h: R + 3ns	0h		
	3					
	4	DLYXRS	LSB Delay Adjustment for XRS MSB 0h: 0ns, 1h: +4ns, 2h: +7ns, 3h: −8ns	0h		
	5					
	6	DTYXRS	LSB Duty Adjustment for XRS MSB 0h: Norm, 1h: F + 3ns, 2h: F + 6ns, 3h: R + 3ns	0h		
7						
6	0	(Low)	"0" fixed	0		66h
	1					
	2					
	3					
	4					
	5					
	6					
	7					
7	0	(Low)	"0" fixed	0		
	1					
	2	—				
	3					
	4	(Constant)	"2"h fixed	2h		
	5					
	6					
	7	—				

#1: Initial setting value with Power-on

CAT7		Serial input					
Byte	bit	Name	Description	#1	Block	Address	
8	0	(Low)	"0" fixed	0		68h	
	1						
	2						
	3						
	4						
	5						
	6						
	7						
9	0	SFTVL	LSB	01h	STG	69h	
	1		SHIFTER V Lsb 8 bit				
	2						
	3						
	4						
	5						
	6						
	7		MSB				
10	0	(Low)	"0" fixed	0		6Ah	
	1						
	2	SFTVM	SHIFTER V Msb 1 bit	0h	STG		
	3	(Low)	"0" fixed	0			
	4	SFTSPED	LSB	0h	MAIN		
	5		SHIFTER SPEED Adjustment				
	6		MSB				
	7	(Constant)	"1" fixed	1			
11	0	DEF1HL	LSB	0h	STG	6Bh	
	1		DEFect 1 H Lsb 8 bit				
	2						
	3						
	4						
	5						
	6						
	7		MSB				

#1: Initial setting value with Power-on

CAT7		Serial input				
Byte	bit	Name	Description	#1	Block	Address
12	0	DEF1VL	LSB	0h	STG	6Ch
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
13	0	DEF1HM	LSB	0h	STG	2Eh
	1		MSB			
	2	DEF1VM	LSB	0h	STG	
	3		MSB			
	4	DEF1L	DEFect 1 Large def	0	STG	
	5	—				
	6					
	7					
14	0	DEF2HL	LSB	0h	STG	6Eh
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
15	0	DEF2VL	LSB	0h	STG	6Fh
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT7		Serial input				
Byte	bit	Name	Description	#1	Block	Address
16	0	DEF2HM	LSB	0h	STG	60h
	1		DEFect 2 H Msb 2 bit			
	2	DEF2VM	LSB	0h	STG	
	3		DEFect 2 V Msb 2 bit			
	4	DEF2L	DEFect 2 Large def	0	STG	
	5	—				
	6					
	7					

#1: Initial setting value with Power-on

Category 8: SOUT

CAT8		Serial input				
Byte	bit	Name	Description	#1	Block	Address
0	0	CAT8	LSB			
	1					
	2					
	3					
	4		Category select code 08h: SOUT			
	5					
	6					
	7		MSB			
1	0	SOBYTE	LSB	00h	MAIN	
	1					
	2					
	3					
	4		Serial Out start Byte number			
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

Category 9: EXTCON

CAT9		Serial input				
Byte	bit	Name	Description	#1	Block	Address
0	0	CAT9	LSB			
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
1	0	—				
	1					
	2					
	3					
	4					
	5					
	6					
	7					
2	0	—				
	1					
	2					
	3					
	4					
	5					
	6					
	7					
3	0	—				
	1					
	2					
	3					
	4					
	5					
	6					
	7					

#1: Initial setting value with Power-on

CAT9		Serial input				
Byte	bit	Name	Description	#1	Block	Address
4	0	—				
	1					
	2					
	3					
	4					
	5					
	6					
	7					
5	0	WBR	LSB	37h	C	
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
6	0	WBG	LSB	26h	C	
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			
7	0	WBB	LSB	39h	C	
	1					
	2					
	3					
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT9		Serial input				
Byte	bit	Name	Description	#1	Block	Address
8	0	WBYREFH	LSB	D0h	OPD	
	1		Y slice High Level			
	2					
	3					
	4					
	5					
	6					
	7		MSB			
9	0	WBYREFL	LSB	04h	OPD	
	1		Y slice Low Level			
	2					
	3					
	4					
	5					
	6					
	7		MSB			
10	0	(Low)	"00"h fixed	00h		
	1					
	2					
	3					
	4					
	5					
	6					
	7					
11	0	(Low)	"00"h fixed	00h		
	1					
	2					
	3					
	4					
	5					
	6					
	7					

#1: Initial setting value with Power-on

CAT9		Serial input					
Byte	bit	Name	Description	#1	Block	Address	
12	0	—				72h	
	1						
	2						
	3						
	4	DRSL1	LSB	1h	TOP		
	5		H-driver ability (H1, H2)				
	6		MSB				
	7	—					
13	0	(Low)	"0" fixed	0		73h	
	1						
	2	(Constant)	"3"h fixed	3h			
	3						
	4	(Constant)	"1"h fixed	1h			
	5	(Low)	"0" fixed	0			
	6						
	7	IDINV	ID INVerse	NT = 0h PAL = 1h	C		
14	0	(Low)	LSB	0		74h	
	1		"0" fixed				
	2						
	3						MSB
	4	PLLSW	PLLSW 0: Normal, 1: ON (38MHz)	0	TOP		
	5	DRSL2	LSB	1h	TOP		
	6		H-driver ability (RG)				
	7		MSB				
15	0	YDLY	LSB	0h	Y	75h	
	1		MSB Y DLY 0 – 3CK				
	2	CDLY	LSB	0h	C		
	3		MSB C DLY 0 – 3CK				
	4	YDDL	LSB	0h	DIF		
	5		MSB Y Digital DLY 0 – 3CK				
	6	CDDL	LSB	0h	DIF		
	7		MSB C Digital DLY 0 – 3CK				

#1: Initial setting value with Power-on

CAT9		Serial input				
Byte	bit	Name	Description	#1	Block	Address
16	0	RMATY	LSB	2Dh	C	76h
	1					
	2					
	3		R matrix R = <u>RMATY</u> × Yr + Cr + RMATC × Cb			
	4					
	5					
	6					
	7		MSB			
17	0	RMATC	LSB	00h	C	77h
	1					
	2					
	3		R matrix R = RMATY × Yr + Cr + <u>RMATC</u> × Cb			
	4					
	5					
	6					
	7		MSB			
18	0	BMATY	LSB	45h	C	78h
	1					
	2					
	3		B matrix B = <u>BMATY</u> × Yb + Cb + BMATC × Cr			
	4					
	5					
	6					
	7		MSB			
19	0	BMATC	LSB	BBh	C	79h
	1					
	2					
	3		B matrix B = BMATY × Yb + Cb + <u>BMATC</u> × Cr			
	4					
	5					
	6					
	7		MSB			

#1: Initial setting value with Power-on

CAT9		Serial input				
Byte	bit	Name	Description	#1	Block	Address
20	0	(Low)	"0" fixed	0		7Ah
	1					
	2	DRSL3	LSB	1h	TOP	
	3		H-driver ability (XSHP, XSHD)			
	4		MSB			
	5	DRSL4	LSB	1h	TOP	
	6		H-driver ability (XRS)			
	7		MSB			

#1: Initial setting value with Power-on

Serial output

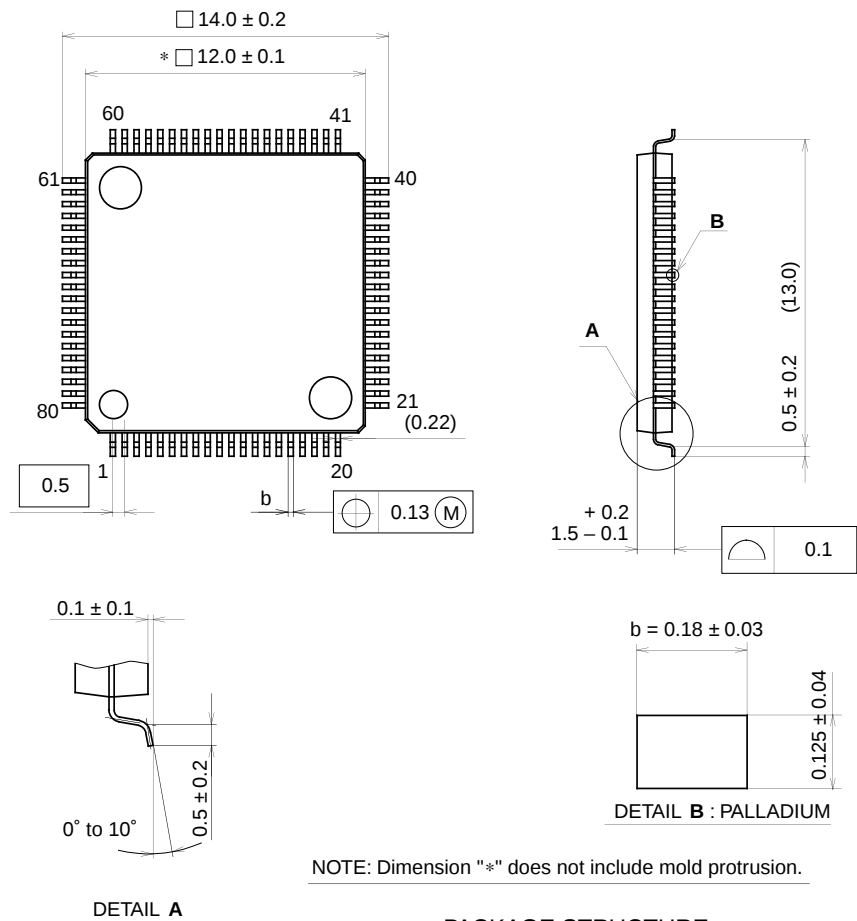
CAT8		Serial output		
Byte	bit	Name	Description	Block
1	0	—		
	1			
	2			
	3			
	4			
	5			
	6			
	7			
2	0	—		
	1			
	2			
	3			
	4			
	5			
	6			
	7			
3	0	—		
	1			
	2			
	3			
	4			
	5			
	6			
	7			
4	0	—		
	1			
	2			
	3			
	4			
	5			
	6			
	7			

CAT8		Serial output		
Byte	bit	Name	Description	Block
5	0	AWOUT1	LSB	AWB
	1			
	2			
	3			
	4		AWB OUT 1	
	5			
	6			
	7		MSB	
6	0	AWOUT2	LSB	AWB
	1			
	2			
	3			
	4		AWB OUT 2	
	5			
	6			
	7		MSB	
7	0	AWOUT3	LSB	AWB
	1			
	2			
	3			
	4		AWB OUT 3	
	5			
	6			
	7		MSB	
8	0	AWOUT4	LSB	AWB
	1			
	2			
	3			
	4		AWB OUT 4	
	5			
	6			
	7		MSB	

CAT8		Serial output		
Byte	bit	Name	Description	Block
9	0	E2RDATA	LSB	MAIN
	1			
	2			
	3			
	4			
	5			
	6			
	7		MSB	
EEPROM READ DATA				

Package Outline Unit: mm

80PIN LQFP (PLASTIC)



NOTE: Dimension "*" does not include mold protrusion.

PACKAGE STRUCTURE

SONY CODE	LQFP-80P-L01
EIAJ CODE	P-LQFP80-12x12-0.5
JEDEC CODE	

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	PALLADIUM PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE MASS	0.5g