SHARP

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To;

PRELIMINARY

SPECIFICATIONS

Product Type : 1/4-type lens-integrated CMOS Color Area Sensor for VGA

Model No. LZ0P3816

※This specifications contains 30 pages including the cover.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

DATE:

BY:

PRESENTED

BY: Y. Kusano
Y. KUSANO
Dept. General Manager

SHARP CORPORATION
IMAGE DEVICE ENGINEERING DEPT. II
02. 2. 00
MAIL DATE
IC GROUP

REVIEWED BY:

PREPARED BY: K. Sakai

Image Device Engineering Department II
System LSI Development Center
Integrated Circuits Development Group
SHARP CORPORATION

SHARP

LZ0P3816

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(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.

● Please direct all queries regarding the products covered herein to a sales representative of the company.

CONTENTS

1. GENERAL DESCRIPTION

LZ0P3816 is a 1/4-type(4.5mm) lens-integrated image sensor consists of PN photodiodes and CMOS(complementary Metal-Oxide-Semiconductor) devices. The sensor further includes a timing generator(TG), a correlated double sampling(CDS) circuit, an auto gain control(AGC) circuit and an analog-to-digital converter(ADC) circuit. All circuits of the sensor can be driven by 3.3V single power supply. Having approximately 350,000 pixels(horizontal 703 × vertical 499). Having small lens and LCC-type flat pakage, possible to make ultra-small color camera easily.

Features

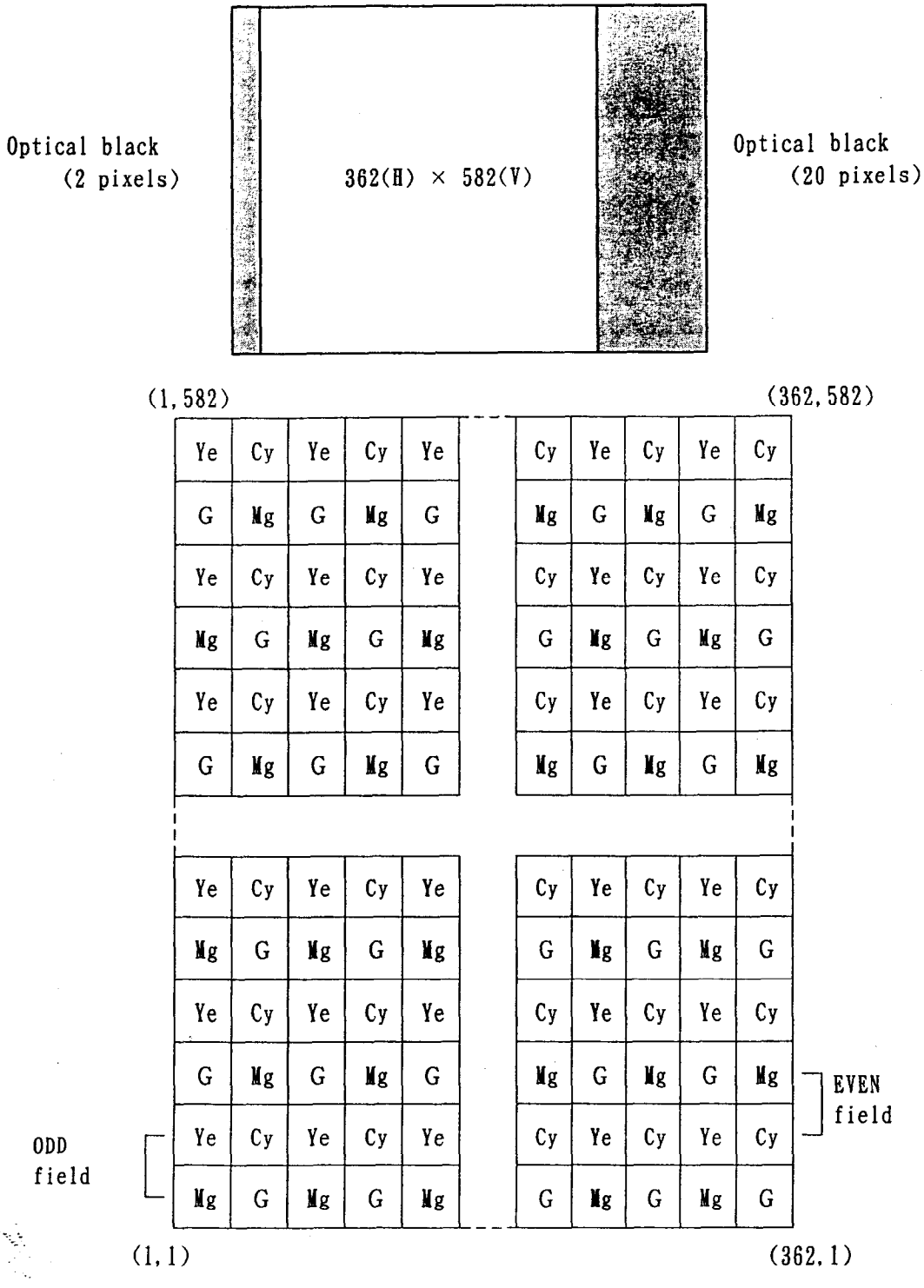
1) Progressive scan
2) Compatible with VGA format
3) Number of image pixels : Horizontal 655 × vertical 494
   Pixel pitch : Horizontal 5.6μm × vertical 5.6μm
   Number of optical black pixels : Horizontal; front 2 and rear 24
   Vertical ; front 3 and rear 3
4) R, G and B primary color mosaic filters
5) Analog output and 8-bit digital output
6) Variable electronic shutter(1/30 to 1/10000 sec.)
7) Variable gain control(4 to 30 dB)
8) No burn-in and no image distortion
9) No smear and low blooming
10) Image inversion function (horizontally and/or vertically)
11) Monitoring mode (60 fields/sec)
12) 3.3V single power supply
13) Power save mode
14) 14-pin half-pitch WLCC-type pakage
    (Base section size:approx. 12mm×11 mm)
15) Built-in optical Low-Pass-Filter
16) 50° (degrees) of horizontal view angle lens includes [F3.4]
17) Not designed or reted as radiation hardened

Applications

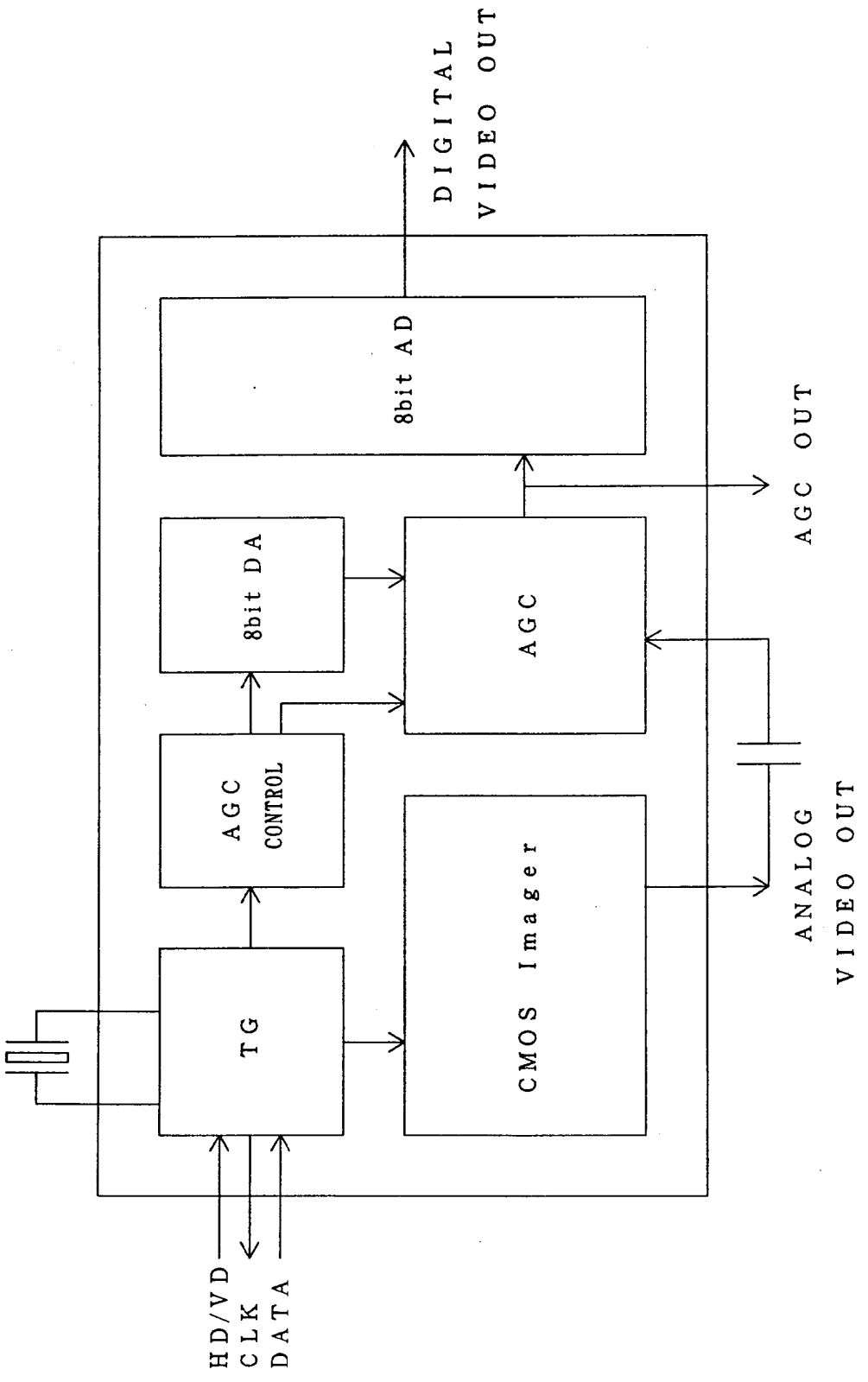
1) Mobile Use (Telephone, PC, PDA Built-in),
2) Digital still camera
3) Pattern recognition

※The circuit diagram and others included in this specification are intended for use to explain typical application examples. Therefore, we take no responsibility for any problem as may occur due to the use of the included circuit and for any problem with industrial proprietary rights or other rights.

2. ARRANGEMENT OF PIXELS AND COLOR FILTERS

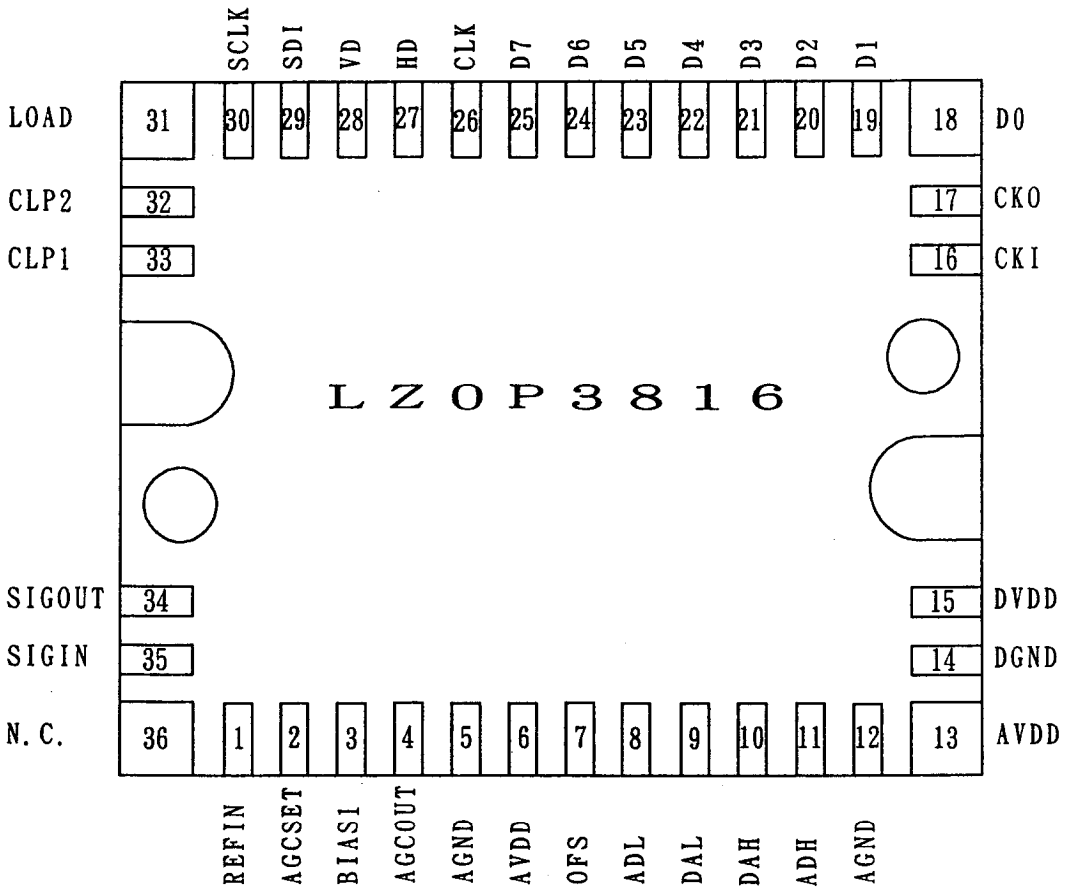


3. BLOCK DIAGRAM



4. PIN CONFIGURATION

(TOP VIEW)



5. PIN DESCRIPTION

Pin No.	Symbol	I/O	A/D	Description
1	REFIN	I	A	Reference Voltage for Analog Input
2	AGCSET	—	A	Resistor for AGC
3	BIAS1	—	A	Analog Bias Voltage 1 for Image Sensor
4	AGCOUT	O	A	AGC Output
5	AGND	—	A	Analog Ground
6	AVDD	—	A	Analog Power Supply
7	OFS	—	A	Offset Bias Voltage for AGC
8	ADL	—	A	Bottom ADC Reference Voltage
9	DAL	—	A	Bottom DAC Reference Voltage
10	DAH	—	A	Top DAC Reference Voltage
11	ADH	—	A	Top ADC Reference Voltage
12	AGND	—	A	Analog Ground
13	AVDD	—	A	Analog Power Supply
14	DGND	—	D	Digital Ground
15	DVDD	—	D	Digital Power Supply
16	CKI	I	D	Input for Oscillator (24.54MHz *)
17	CKO	O	D	Output for Oscillator
18	D0	O	D	ADC Output (LSB)
19	D1	O	D	ADC Output
20	D2	O	D	ADC Output
21	D3	O	D	ADC Output
22	D4	O	D	ADC Output
23	D5	O	D	ADC Output
24	D6	O	D	ADC Output
25	D7	O	D	ADC Output (MSB)
26	CLK	O	D	Clock output (12.27MHz *)
27	HD	I	D	Horizontal Drive Pulse Input
28	VD	I	D	Vertical Drive Pulse Input
29	SDI	I	D	Data Input (AGC Gain, Offset, Shutter control, Image Inversion, etc.)
30	SCLK	I	D	Shift Clock for Data
31	LOAD	I	D	Load Pulse for Data Input
32	CLP2	—	A	Analog Bias Voltage 2 for Clamp Circuit
33	CLP1	—	A	Analog Bias Voltage 1 for Clamp Circuit
34	SIGOUT	O	A	Analog Image Signal Output
35	SIGIN	I	A	Analog Image Signal Input
36	BIAS2	—	A	Analog Bias Voltage 2 for Image Sensor

* : In the case of 'Normal Mode' and 'Monitoring Mode'.
In the case of 'USB Mode', CKI is 24.00MHz and CLK is 12.00MHz.

6. ELECTRIC CHARACTERISTICS

6-1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Unit
Power Supply Voltage	VDD	−0.3 ~ 4.6	V
Input Signal Voltage	Vϕ	−0.3 ~ VDD+0.3	V
Storage Temperature	Tstr	−20 ~ 70	℃

6-2. RECOMENDED OPERATING CONDITIONS

Parameter		Symbol	MIN	TYP	MAX	Unit	Note
Power Supply Voltage		VDD	3.0	3.3	3.6	V	
Operating Temperature		Topr	-10	25	60	℃	
Oscillator Frequency	Normal Mode	Fck		25.54		MHz	
	Monitoring Mode						
	USB Mode			24.00			
Digital Input Voltage	Low Level	VϕL	0		0.2VDD	V	1
	High Level	VϕH	0.8VDD		VDD	V	
Analog Input Voltage			(Connect to Terminal through Capacitor)				2
Analog Bias Voltage			(Connect to Terminal through Capacitor)				3

Note 1 : Apply to input pins HD, VD, SDI, SCLK and LOAD.

Note 2 : Apply to input pins SIGIN and REFIN. Do not connect to DC directly.

Note 3 : Apply to pins BIAS1, BIAS2, OFS, ADL, DAL, DAH, ADH, CLP1 and CLP2. Do not connect to GND directly.

7. IMAGING CHARACTERISTICS

Readout mode : 1/30 sec, Normal mode
Ambient temperature : 25 ℃
Driving voltage : 3.3 V
Color temperature of light source : 3200K
• Measurement point : Analog image signal output (pin no.34) before AGC and AD.

No.	Parameter	Symbol	Note	Min.	Typ.	Max.	Unit
1	Standard output voltage	Vo	(a)		150		mV
2	Saturation output voltage	Vsat	(b)		700		mV
3	Dark output voltage	Vdark	(c)		2		mV
4	Sensitivity (Green channel)	R (G)	(d)		250		mV
5	Vertical line Fixed Pattern Noise	VFPN	(e)				mVp-p
6	Resolution (at centaer)		(f)	250	300		TV Line
7	Resolution (at corner)		(g)	150	200		TV Line
8	Shading		(h)	30			%
9	Difference of center		(i)			±10	%
10	Current dissipation	IVDD	(j)		20		mA

【Note】

(a) Vo is the average output voltage of Green channel int the central area(H/10, V/10) under uniform illumination. The standard exposure condition is defined when Vo is 150 mV.

(b) The image area is divided into 10 × 10 segments under 10 times exposure of the standard exposure condition. The segment's voltage is the average output voltages of all pixels whithin the segments. Vsat is the minimum segment's voltage of all the segments voltage.

(c) Vdark is the difference between average output voltage of the effective area and that of the OB area, under non-exposure condition.

(d) R(G) is the average output voltage of Green channel at central area(H/10, V/10) when a 1000 lux light source on a 90% reflector is image.

(e) One mean horizontal line signal <bi> is obtained by adding all the horizontal line signals <aij> vertically and dividing them by the line number. <xi> is the deviation of the center pixel from the average of successive 5 pixels in <bi>. V-FPN is the maximum absolute value of <xi>.

(f)The limited resolusion in the central area(H/10, V/10) whitch the image of TV resolusion chart(ex. EIAJ test chart:type-A) can be distinguished on the B/W video monitor when converted into composite video signal.

(g)The limited resolusion in the perpheral area(image height:Y=0.7) under the conditions mentioned above.

(h)Defined following formura at the brightness of standard output voltage.
(Vco/Vce)X100[%] Vco:output voltage of edge of the image. (at Green channel)
Vce:output voltage of center of the image. (at Green channel)

(i)Difference of center between image and monitor. Ratio of horizontal underscaning monitor size.

(j) IVDD is the total current of analog and digital power supply in the dark and on the standard load condition.

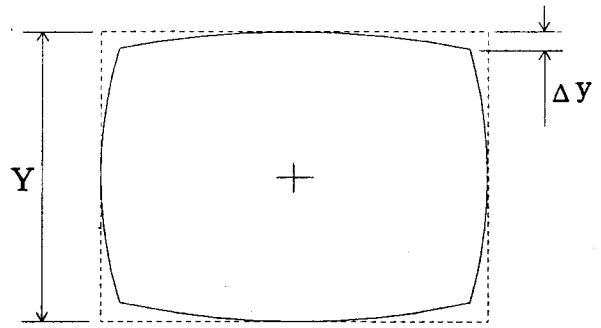
8. LENS SPECIFICATIONS

No	Parameter	Specifications	Note
1	Lens Structure	Prastic, Non-spherical, 2pcs.	
2	Focal Length	3.85mm ±5%	
3	F No.	3. 4 ±5%	
4	Angle of View	Horizontal:approx. 50° [typ. : Reference]	(a)
5	TV Distortion	−1.0%	(b)
6	Focus Adjustment Range	∞～10cm	(c)
7	Torque of Focusing	0.00005～0.001 N・m	(d)

【Conditions】

(a) Effective Image Area : (H)3.67 × (V)2.76mm

(b) TV distortion is defined the formura, (△y／Y) ×100 [%]
at capturing rectangular pattern sized Horizontal by Vertcal as 4by 3.
"Y" is defined as the Vertical height of center of Horizontal line.
"y" is defined as the Vertical height of edge of Horizontal line.

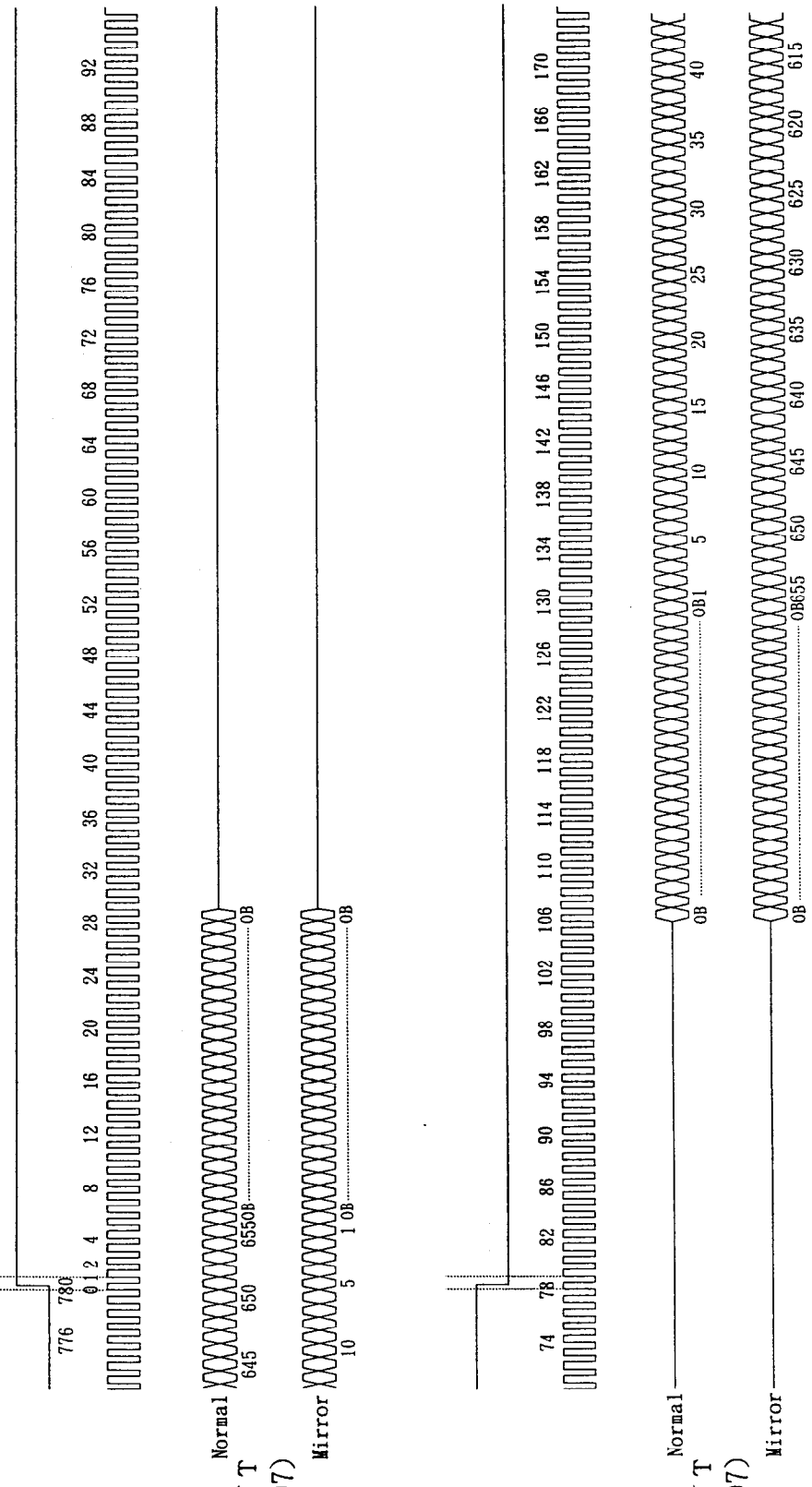


(c) The range isthe best points by adjustment by screwing the lens head.

(d) Toruques which are necessary for turning the lens.
(at shipping of products)

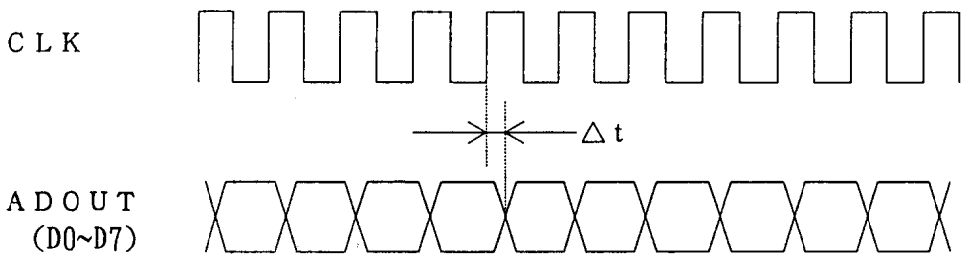
9. TIMING DIAGRAM (NORMAL MODE)

9 – 1. Horizontal Pulse Timing



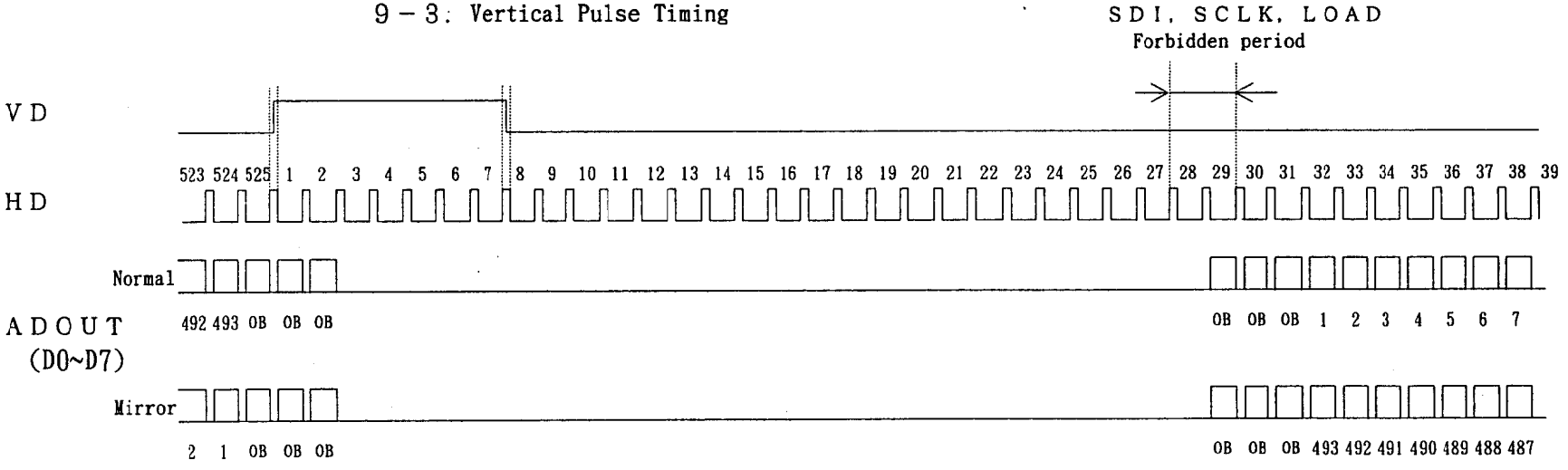
- The rising edge of HD pulse must be between two rising edges of CLK(0) and CLK(1).
- The falling edge of HD pulse must be between two rising edges of CLK(78) and CLK(79).

9 – 2. Phase Relations between Digital Output (ADOUT) and Clock (CLK).



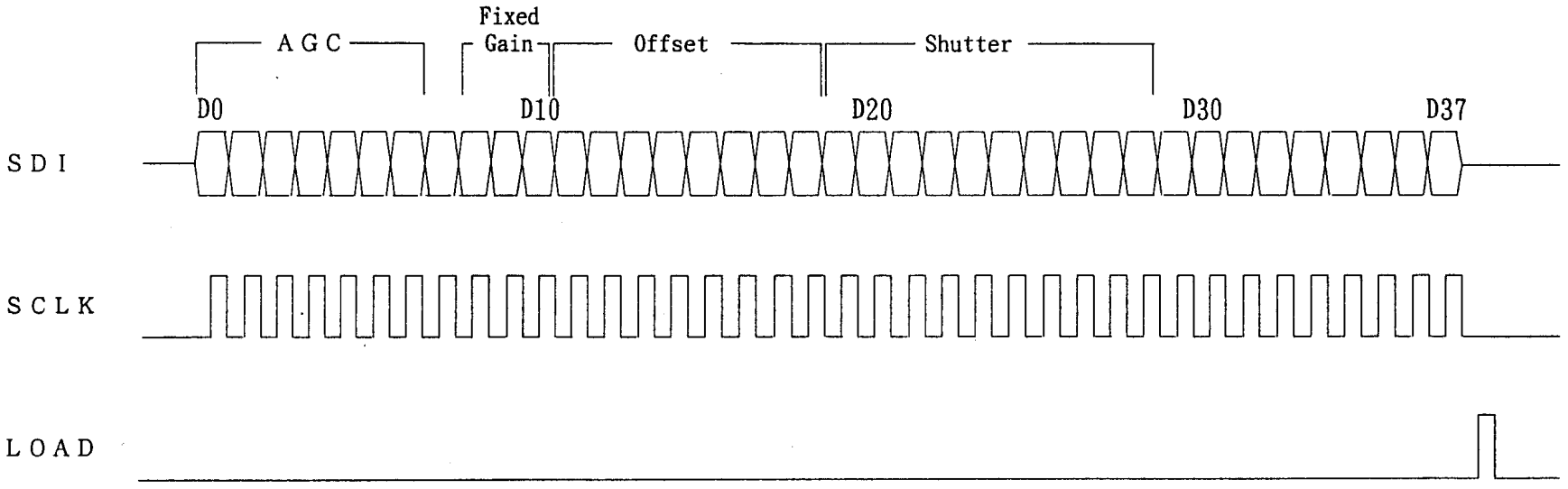
Symbol	Min.	Typ.	Max.	Unit
△t		45		nS

9 – 3. Vertical Pulse Timing



• The rising edge and falling edge of VD pulse must be in high periods of HD pulses.

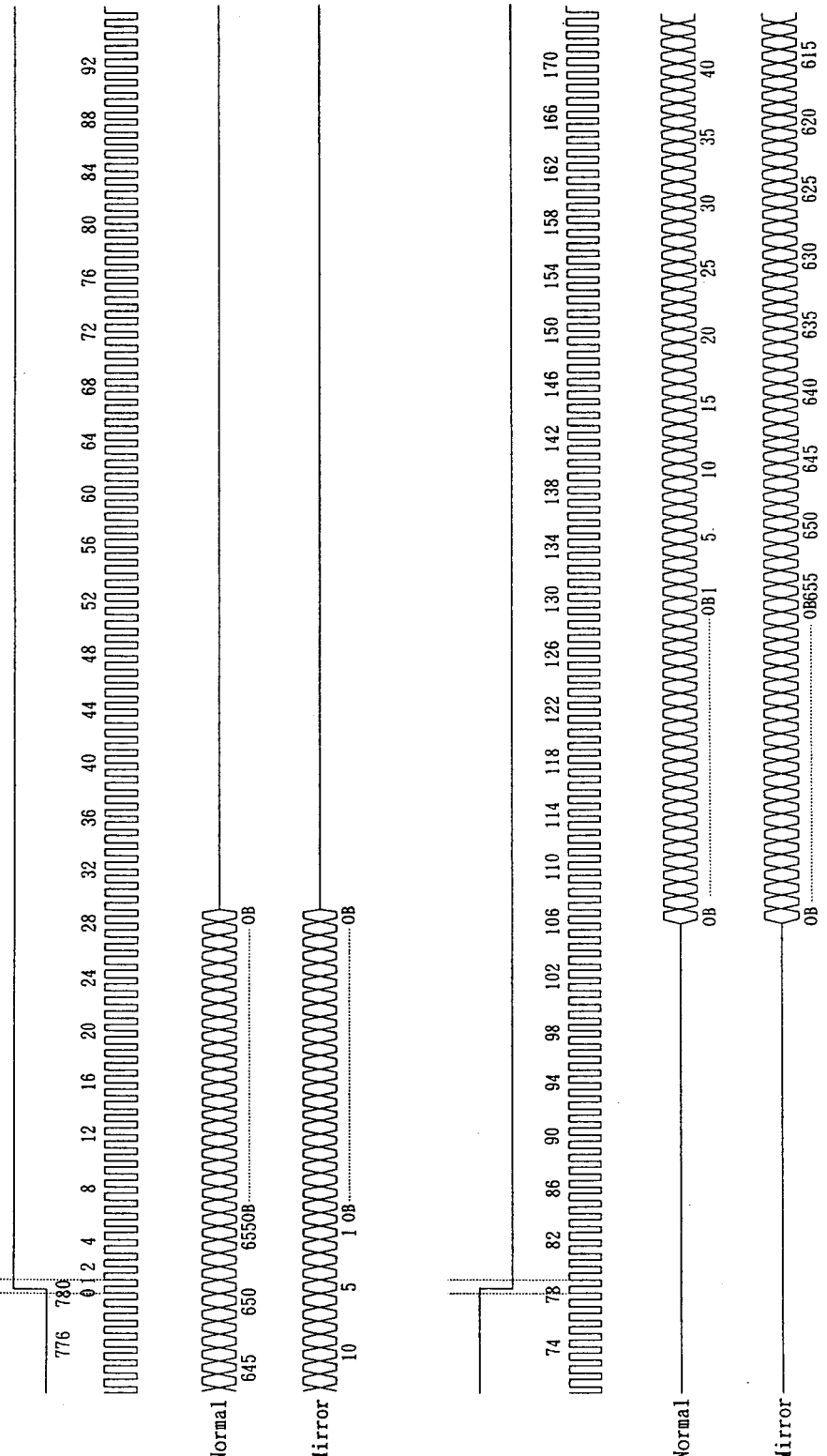
9 – 4. Serial Data Timing (SDI, SCLK, LOAD)



- Data in SDI are taken at the rising edge of SCLK.
- Clock frequency of SCLK should be less than 1/2 of that of CLK.
- Do not insert the pulses SDI, SCLK and LOAD between 28H and 29H, that is described in section 9-3.
- The contents of serial data from D0 to D37 are refered to "Section 12. Description of Serial Data".

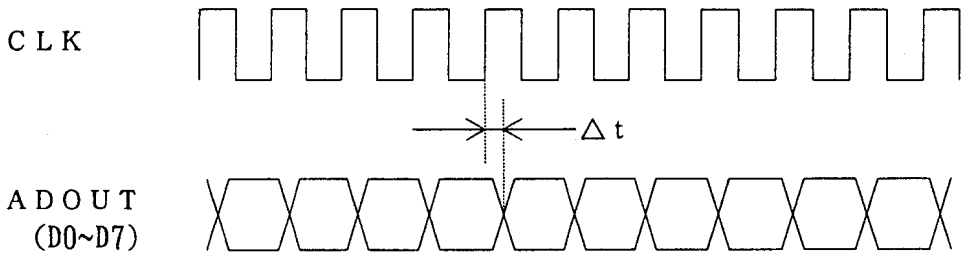
10. TIMING DIAGRAM (MONITORING MODE)

10-1. Horizontal Pulse Timing



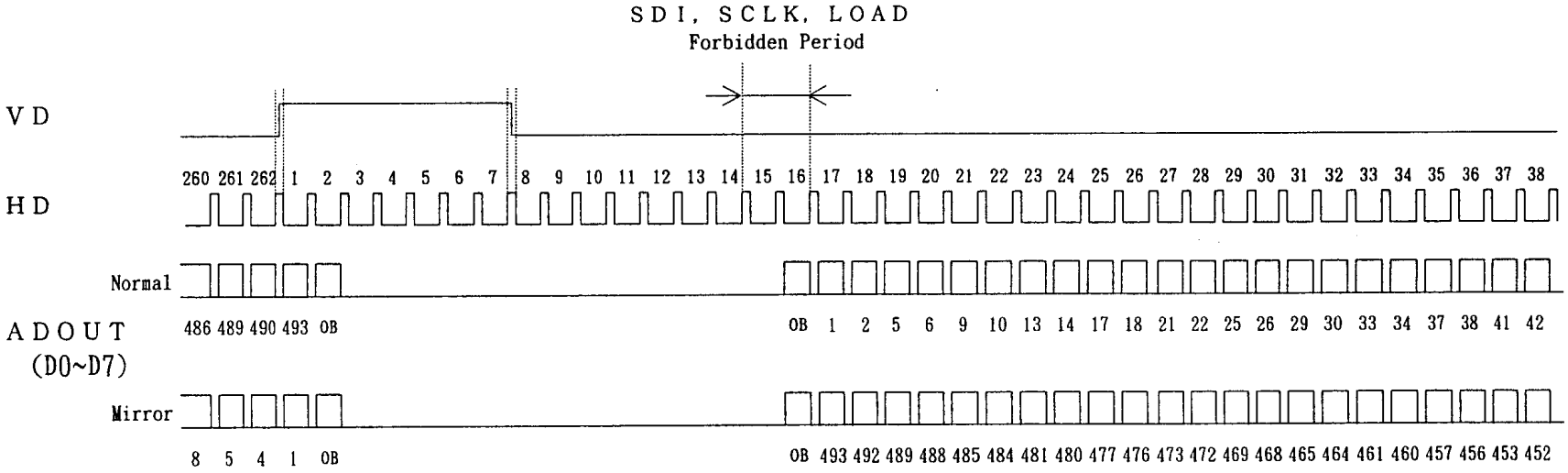
- The rising edge of HD pulse must be between two rising edges of CLK(0) and CLK(1).
- The falling edge of HD pulse must be between two rising edges of CLK(78) and CLK(79).

10－2. Phase Relations between Digital Output (ADOUT) and Clock (CLK).



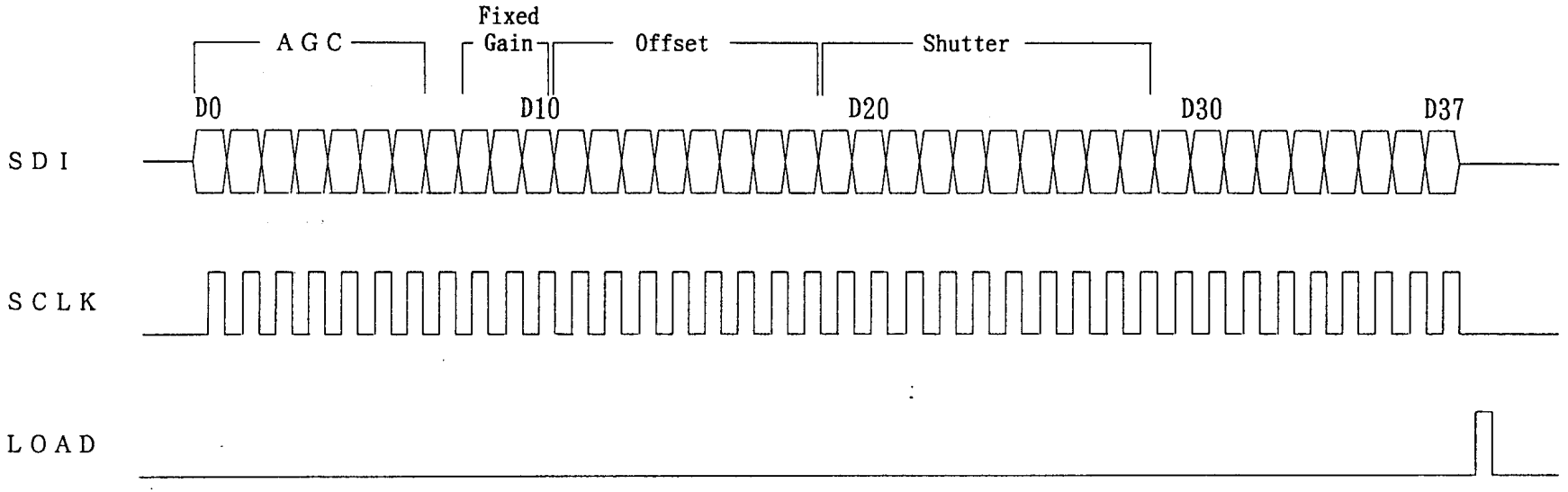
Symbol	Min.	Typ.	Max.	Unit
△t		45		nS

10－3. Vertical Pulse Timing



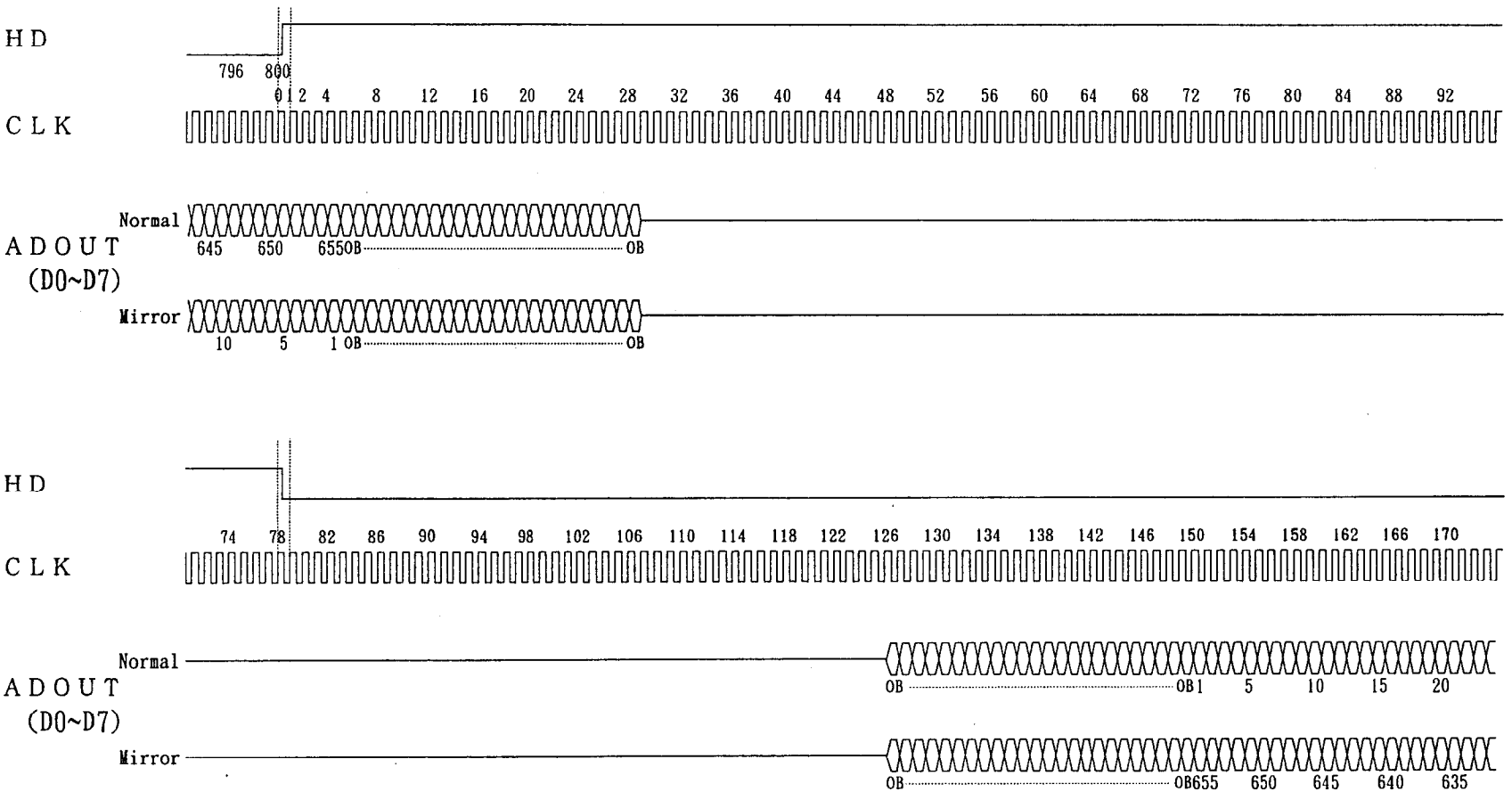
・The rising edge and falling edge of VD pulse must be in high periods of HD pulses.

10-4. Serial Data Timing (SDI, SCLK, LOAD)



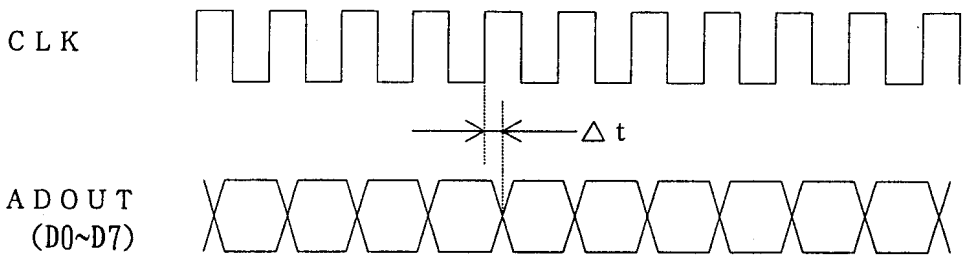
- Data in SDI are taken at the rising edge of SCLK.
- Clock frequency of SCLK should be less than 1/2 of that of CLK.
- Do not insert the pulses SDI, SCLK and LOAD between 15H and 16H, that is described in section 10-3.
- The contents of serial data from D0 to D37 are refered to "Section 12. Description of Serial Data".

11-1. Horizontal Pulse Timing



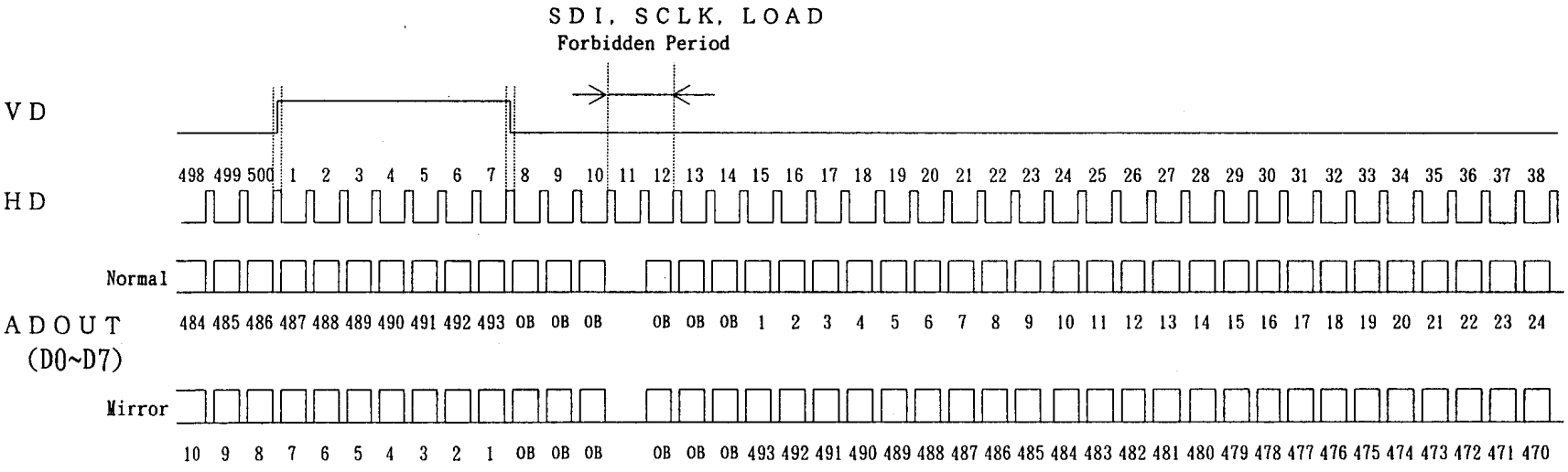
- The rising edge of HD pulse must be between two rising edges of CLK(0) and CLK(1).
- The falling edge of HD pulse must be between two rising edges of CLK(78) and CLK(79).

11－2. Phase Relations between Digital Output (ADOUT) and Clock (CLK).



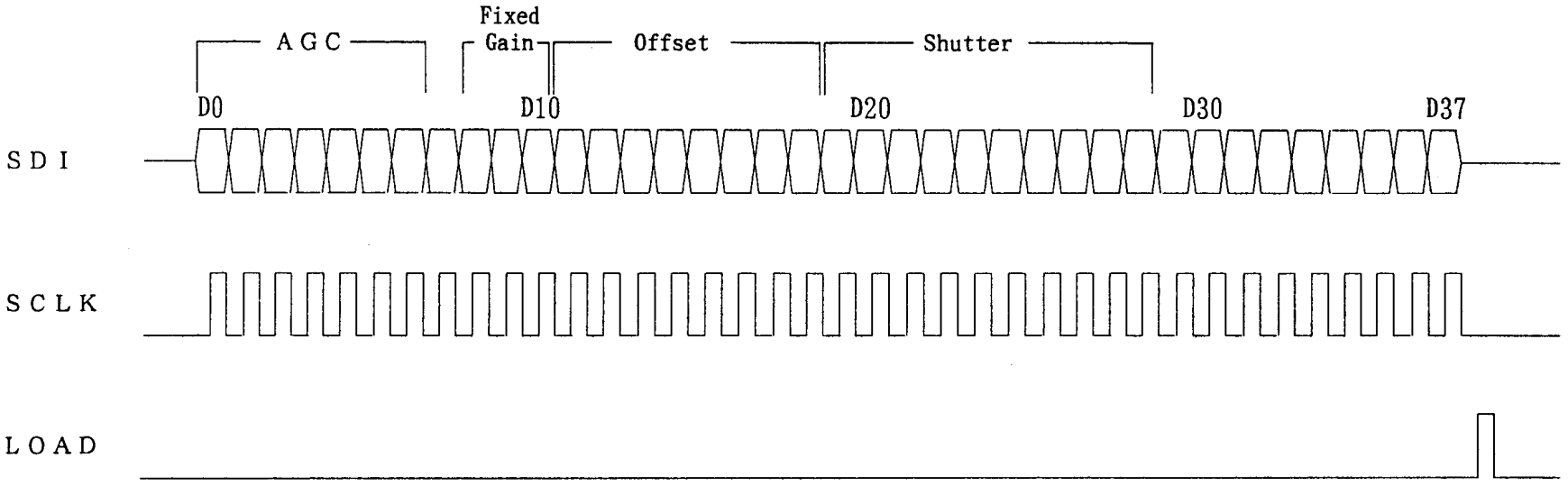
Symbol	Min.	Typ.	Max.	Unit
△t		45		nS

11－3. Vertical Pulse Timing



・The rising edge and falling edge of VD pulse must be in high period of HD pulses.

11－4. Serial Data Timing (SDI, SCLK, LOAD)



- Data in SDI are taken at the rising edge of SCLK.
- Clock frequency of SCLK should be less than 1/2 of that of CLK.
- Do not insert the pulses SDI, SCLK and LOAD between 11H and 12H, that is described in section 11-3.
- The contents of serial data from D0 to D37 are refered to "Section 12. Description of Serial Data".

12. DESCRIPTION OF SERIAL DATA

Address	Symbol	Function
D0	AGC6 (MSB)	Auto gain control (0 to 20 dB)
D1	AGC5	
D2	AGC4	
D3	AGC3	
D4	AGC2	
D5	AGC1	
D6	AGC0 (LSB)	
D7		No use (Fix to Low Level)
D8	MAX2 (MSB)	Fixed gain select (3 to 10 dB)
D9	MAX1	
D10	MAX0 (LSB)	
D11	OFS7 (MSB)	Offset level control of AGC output (0.9 to 1.5 V)
D12	OFS6	
D13	OFS5	
D14	OFS4	
D15	OFS3	
D16	OFS2	
D17	OFS1	
D18	OFS0 (LSB)	
D19	SHT9 (MSB)	Shutter speed control (Normal mode : exposure time is 1 to 1/525 frame period) (Monitoring mode : exposure time is 1 to 1/262 frame period) (USB mode : exposure time is 1 to 1/500 frame period)
D20	SHT8	
D21	SHT7	
D22	SHT6	
D23	SHT5	
D24	SHT4	
D25	SHT3	
D26	SHT2	
D27	SHT1	
D28	SHT0 (LSB)	
D29	MIRH	H:Horizontal mirror inversion image, L:Normal image
D30	MIRV	H:Vertical mirror inversion image, L:Normal image
D31	MON	H:Monitoring mode(*1), L:Normal or USB mode
D32	SAD2 (MSB)	Phase select of AD clock D32/D33/D34=L/L/L : -30' D32/D33/D34=L/L/H : -15' D32/D33/D34=L/H/L : 0' D32/D33/D34=L/H/H : 15'
D33	SAD1	
D34	SAD0 (LSB)	
D35	LPMD1	Power save mode D35/D36=L/L : all active, D35/D36=H/L : AD off D35/D36=L/H : AD, AGC off, D35/D36=H/H : Inhibited mode
D36	LPMD0	
D37	USB	H:USB mode, L:Normal mode

(*1) Even if Monitoring mode is selected by D31, the sensor becomes USB mode when USB mode is selected by D37.

12-1. SETTING OF AUTO GAIN CONTROL

- One LSB of the gain code represents approximately 0.156dB.
- Nominal gain values at typical codes are shown below.

Auto Gain Control (dB)	D0	D1	D2	D3	D4	D5	D6
0	L	L	L	L	L	L	L
1	L	L	L	L	H	H	L
2	L	L	L	H	H	L	H
3	L	L	H	L	L	H	H
4	L	L	H	H	L	L	H
5	L	H	L	L	L	L	L
6	L	H	L	L	H	H	L
7	L	H	L	H	H	L	L
8	L	H	H	L	L	H	H
9	L	H	H	H	L	L	H
10	H	L	L	L	L	L	L
11	H	L	L	L	H	H	L
12	H	L	L	H	H	L	L
13	H	L	H	L	L	H	H
14	H	L	H	H	L	L	H
15	H	L	H	H	H	H	H
16	H	H	L	L	H	H	L
17	H	H	L	H	H	L	L
18	H	H	H	L	L	H	H
19	H	H	H	H	L	L	H
20	H	H	H	H	H	H	H

12-2. SETTING OF FIXED GAIN

- One LSB of the gain code represents 1dB.

Fixed Gain (dB)	D8	D9	D10
3	L	L	L
4	L	L	H
5	L	H	L
6	L	H	H
7	H	L	L
8	H	L	H
9	H	H	L
10	H	H	H

12-3. SETTING OF OFFSET LEVEL

- One LSB of the offset code represents approximately 0.002V.
- Nominal offset values at typical codes shown below.

Offset Level (V)	D11	D12	D13	D14	D15	D16	D17	D18
0.9	L	L	L	L	L	L	L	L
1.0	L	L	H	L	H	L	H	H
1.1	L	H	L	H	L	H	L	H
1.2	H	L	L	L	L	L	L	L
1.3	H	L	H	L	H	L	H	L
1.4	H	H	L	H	L	H	L	H
1.5	H	H	H	H	H	H	H	H

12-4. SETTING OF SHUTTER SPEED

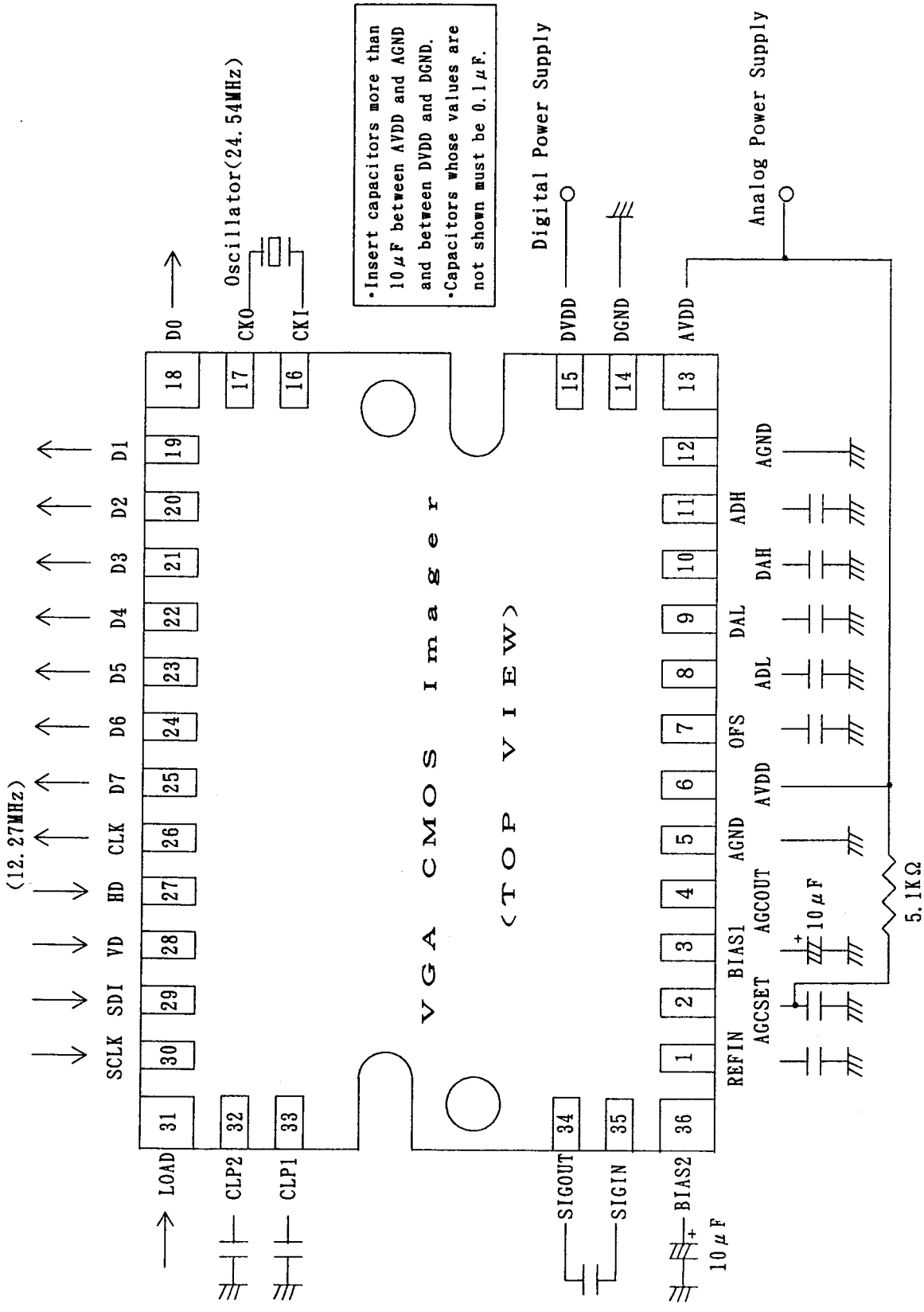
- One LSB of the shutter speed code represents 1H, where 1H is HD pulse period.
- Shutter speed values at typical codes are shown belowin the case of Normal, Monitoring and USB Modes.

Shutter Speed (Exposure Time Unit:1H)			D19	D20	D21	D22	D23	D24	D25	D26	D27	D28
Normal	Monitoring	USB										
525	262	500	L	L	L	L	L	L	L	L	L	L
•	•	•										
•	•	•										
265	2	240	L	H	L	L	L	L	L	H	L	L
264	1	239	L	H	L	L	L	L	L	H	L	H
263	262	238	L	H	L	L	L	L	L	H	H	L
•	•	•										
•	•	•										
27	262	2	L	H	H	H	H	H	L	L	H	L
26	262	1	L	H	H	H	H	H	L	L	H	H
25	262	500	L	H	H	H	H	H	L	H	L	L
•	•	•										
•	•	•										
2	262	500	H	L	L	L	L	L	H	L	H	H
1	262	500	H	L	L	L	L	L	H	H	L	L
525	262	500	H	L	L	L	L	L	H	H	L	H
•	•	•										
•	•	•										
525	262	500	H	H	H	H	H	H	H	H	H	H

12-5. SETTING OF DRIVING MODES

Function	D31	D37
Normal Mode	L	L
USB Mode	L	H
Monitoring Mode	H	L
USB Mode	H	H

13. STANDARD OPERATING CIRCUIT EXAMPLE



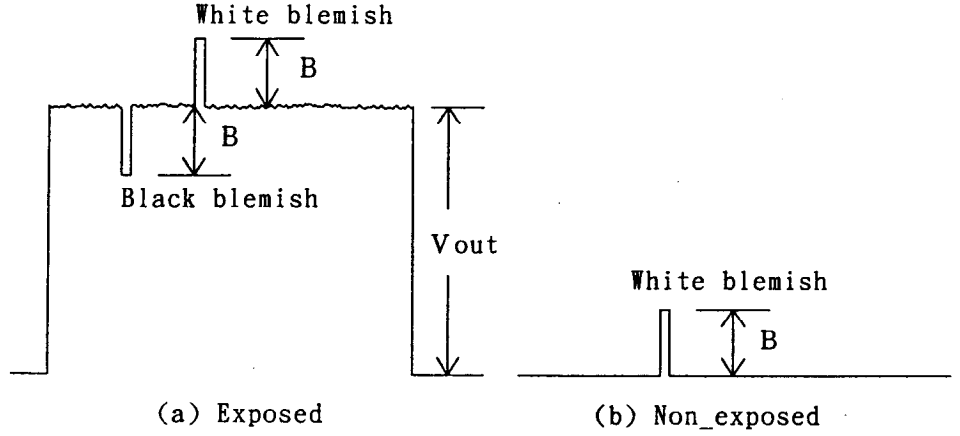
14. SPECIFICATION FOR BLEMISH 【tentative】

1) Definition of blemish

	Level of blemish (mV)	Permitted number of blemish	Note
White blemish (Exposed)	50 ≦ B	0	・ Vout = Vstd (Green channel : 150mV) ※Refer to note below
	B < 50	no count	
Black blemish (Exposed)	50 ≦ B	0	
	B < 50	no count	
White blemish (Non_exposed)	100 ≦ B	0	
	40 ≦ B < 100	10	
	20 ≦ B < 40	20	
	B < 20	no count	

《note》
- B : Blemish level defined in fig. below.
- Vout : Average output voltage at Green channel.
- Vstd : 150 mV. The standard output voltage defined in the specification of " 7. Imaging Characteristics "

2) Measureing conditions
- Operating temperature : Topr = 25℃ / Vdd = 3.3V
- Measureing point : Analog image signal output(Pin No. 34) before AGC and AD.



(Vout = 150mV at Green channel)

fig. Definition of blemish level

15. CAUTIONS FOR USE

1. Package breakage

In order to prevent the package, the lens holder and lens from being broken, follow the instructions below:

1) This CMOS image sensor is a precise optical component and the packaege-base material is ceramic. Therefore, please be careful about the following instructions.
   - Take care not to drop the device when mounting, handling, or transporting.
   - Avoid giving a shock to the package. Especially when leads are fixed to the shocks or the circuit board, a small shock could break the package more easily than when the package isn't fixed.

2) When adjusting focus, screw the lens holder to the circuits board before soldering the leads. At that time, make sure to use a circuit board with plenty of strength, and to avoid the packeage and lens holder from being broken, the following screw and clamp torque are recommended.
   - Recommended mounting screw :
     No. 0(per JIS Standard) ϕ1.7mm pan head Tapping screws(B-tight, #3)
     Length : L=6.0mm + the thicknesses of the circuit board
   - Recommended clamp Torque : 0.012 N•m
     [however, when the thickness of the circuit board is thinner than t=2.0mm]

3) If any damage or breakage occur on the surface of the lens, its characteristics could deteriorate.
   Therefore,
   - Do not hit the Lens.
   - Do not give a shock large enough to cause distortion.
   - Do not scrub or scratch surface of the lens.

   --- Even a soft cloth or applicator, if dry, could cause dust to scratch the Lens.

2. Electrostatic Damage

As compared with general MOS-LSI, CMOS image sensor has lower ESD.
Therefore, take the following anti-static measures when handling the CMOS image sensor.

1) Always discharge static electricity by grounding the human body and the instrument to be used. To ground the human body, provide resistance of about 1MΩ between the human body and the ground to be on the safe side.
2) When directly handling the device with the fingers, hold the lens holder and do not touth the lead.
3) To avoid generating static electricity,
   a. do not scrub the body and lens surface with cloth etc.
   b. do not attach any tape or labels.
4) When storing or transporting the device, put it in a container of conductive material.

3. Dust and contamination

Dust or contamination on the surface of lens and the inside of the lens holder could deteriorate the output characteristic or cause a scar. In order to minimize dust or contamination on the device, take the following precautions:

1) Do not remove the lens from the body.
Especially when adjusting macro, be careful not to remove the lens by turning it counterclockwise too much.

2) Do not touch the surface of the lens with the fingers. If dust or contamination gets on the surface of the lens, the following cleaning method is recommended:
- Hnadle the built-in lens CMOS image sensor in a clean environment such as a cleaned booth.
(The cleanliness level should be, if possible, if possible class 1000 at least.)
- Dust from static electricity should be blown off with an ionized air blower. For anti-electrostatic measures, however, ground all the leads on the device before blowing off the dust.
- The contamination on the surface of the lens should be wiped off with a clean applicator soaked in isopropyl alcohol. Wipe slowly and gently in one direction only.
  ——— Frequently replace the applicator and do not use the same applicator to clean more than one device.
- Make sure there is no dust or contamination on the lens and screw it on the lens holder.

4. Other

1) Soldering should be manually performed within 2 seconds per pin at 400℃ maximum at soldering iron.
- Use ESD-measured soldering iron.
- The conditions of the soldering time in which the soldering iron touches the package.
  ——— In case where the soldering may exceed 2 seconds per pin, resume the work after the device returns to normal temperature.
- Do not put too much force onto the lens and the lens holder while soldering.
- Be careful not to let the soldering iron touch the lens holder.
  ——— Soldering can be quickly/neatly done by laying the soldering iron so it lightly touches the border between the package and the circuit board and sliding it in sideways.

2) There is no guarantee of the performance of the device which has been removed or resoldered after being soldered once under the conditions mentioned above.

3) Avoid using or storing the CMOS image sensor at high temperature or high humidity as it is a precise optical component. Do not give a mechanical shock to the CMOS image sensor.

4) Do not expose the device to strong light. For the color device, long exposure to strong light will fade the color of the color filters.

16. PACKAGE OUTLINE AND PACKING SPECIFICATION

1. Package Outline Specification
Refer to attached drawing

2. Markings
Marking contents
(1) Product name : LZ0P3816
(2) Company name : SHARP
(3) Country name : JAPAN
(4) Date code : YY WW D XX

Denotes the production ref. code. (1~2figures)
Denotes the production day of the week.

1	2	3	4	5	6	7
SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.

Denotes the production week.
(01, 02, 03, • • • •, 52, 53)
Denotes the production year.
(Lower two digits of the year.)

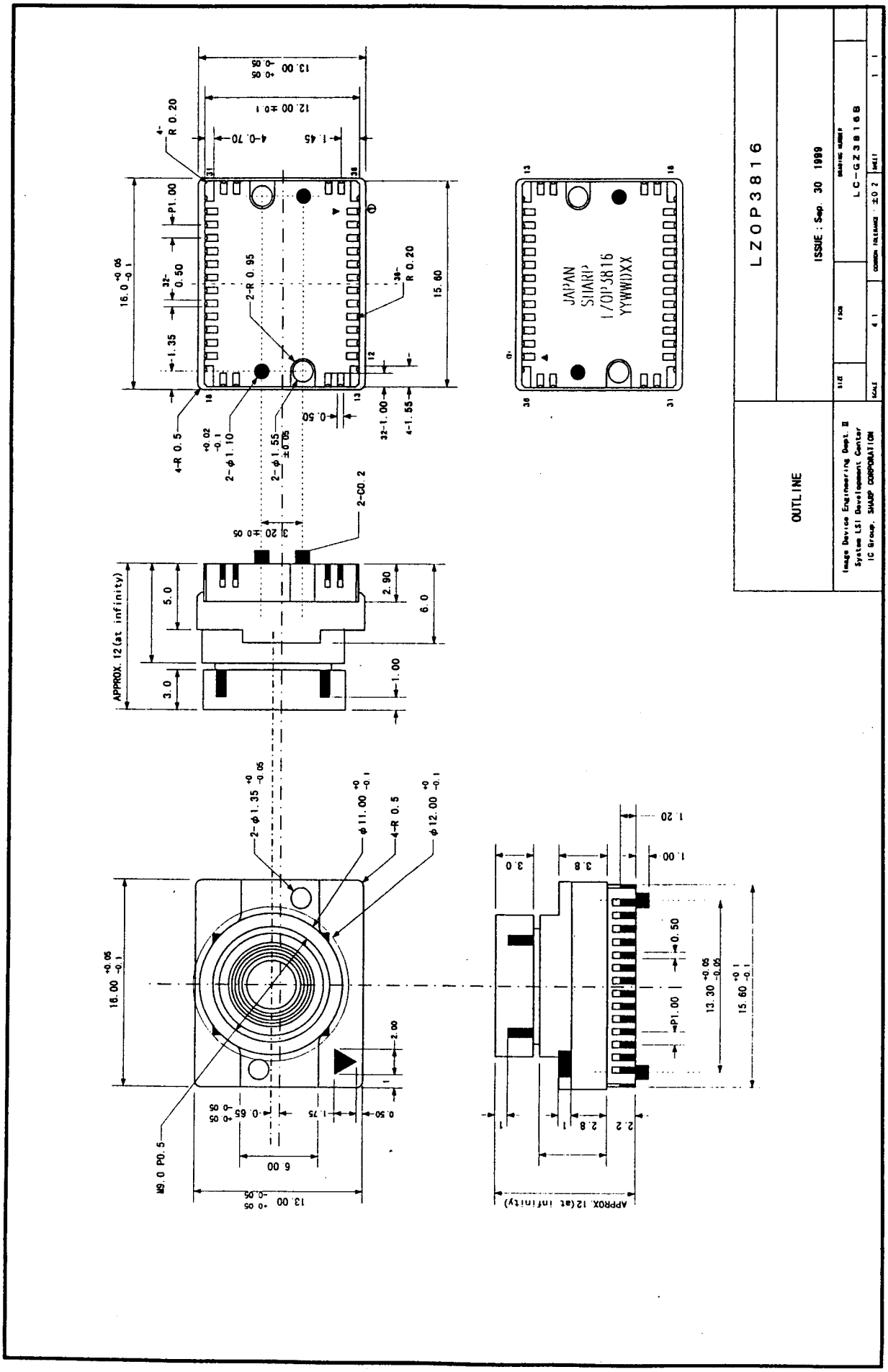
Positions of markings are shown in the package outline drawing.
But, markings shown in theat drawing are not provided any measurements of their charactuers and their positions.

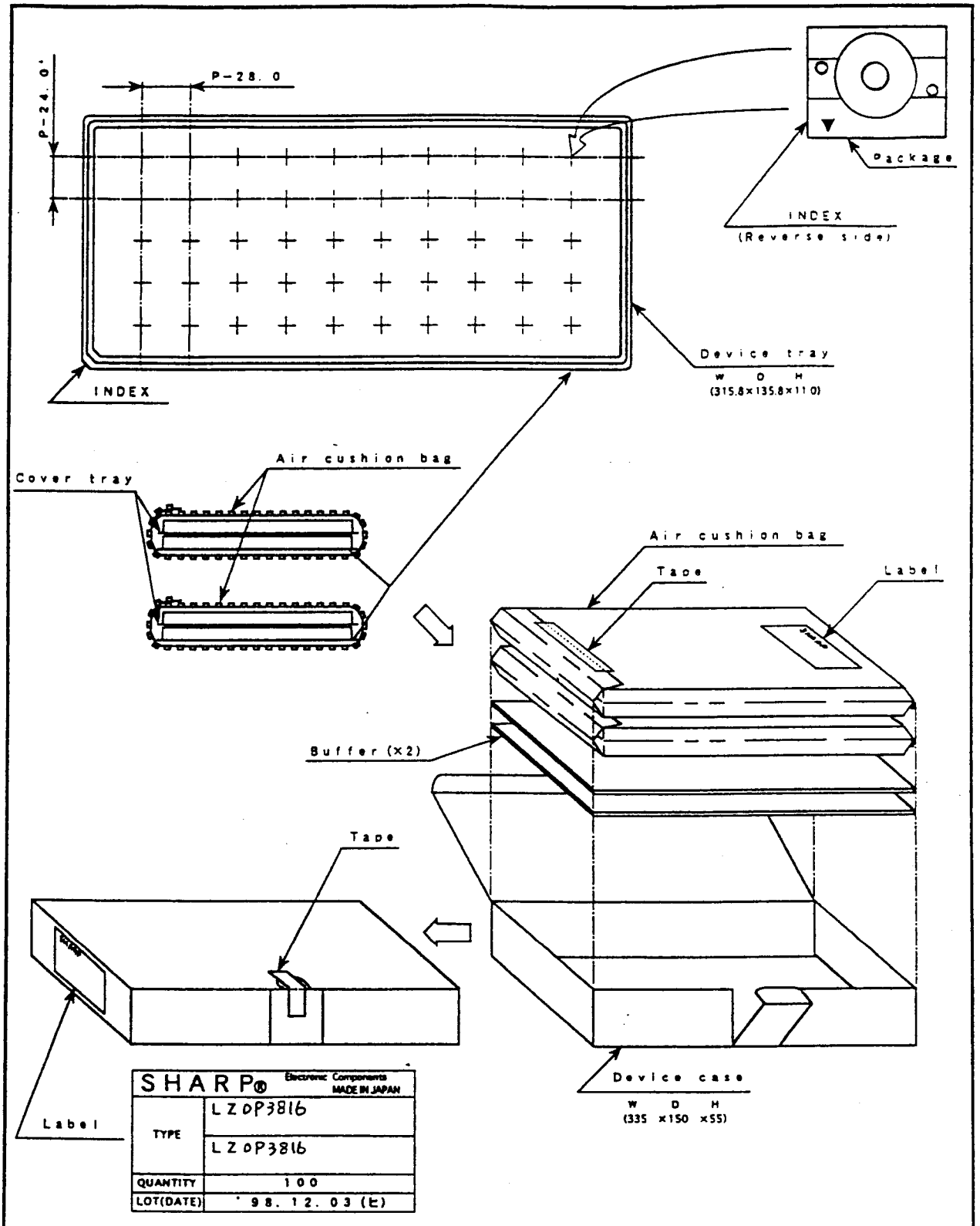
3. Packing Specification
3-1. Packing materials

Material Name	Material Spec.	Purpose
Device case	Cardboard(100devices/case)	Device tray fixing
Device tray	Conductive plastic (50devices/tray)	Device packing(2trays/case)
Cover tray	Conductive plastic(2trays/case)	Device packing
Rubber band		Device tray fixing
Buffer	Cardboard(1sheet/case)	Shock absorber of device tray
Cushion bag	Conductive	Device tray fixing
Tape	Paper	Sealing cushion bag and device case
Label	Paper	Indicates part number, quantity and date of manufacture

3-2. External appearance of packing
Refer to attached drawing

4. Precaution
1) Before unpacking, confirm the imports of the chapter "15. CAUTIONS FOR USE" in this device specifications.
2) Unpacking should be done on the stand treated with anti-ESD. At that time, the same anti-ESD treatment should be done to operater's body, too.


LZOP3816
ISSUE : Sep. 30 1999
OUTLINE
LC-GZ38168
JAPAN
SHARP
LZOP3816
YYWWDXX
APPROX. 12(at infinity)
2-C0.2
4-R 0.5
2-R 0.95
4-R 0.20
2-φ1.10
2-φ1.55
φ11.00
φ12.00
4-R 0.5
M9.0 P0.5
6.00
13.00
18.00
15.80
16.0
5.0
3.0
2.90
6.0
1.00
3.8
2.8
2.2
13.30
15.60



(UNIT : mm)

材質 MATERIAL	仕 上 FINISH	名 称 NAME	External Appearance of Packing
		コード CODE	
MODULE ASSEMBLY APPLICATION ENGINEERING DEPARTMENT			
INTEGRATED CIRCUITS (IC) GROUP		図 番 DRAWING No.	LC-HZ3816A
SHARP CORPORATION			