SHARP

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To: _____

PRELIMINARY CONFIRMATION

SPECIFICATIONS

Product Type 1/3 type solid state B/W imaging device for CCIR system

Model No. LZ2324HJ

※This specifications contains 19 pages including the cover and appendix.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

DATE: _____

BY: _____

PRESENTED

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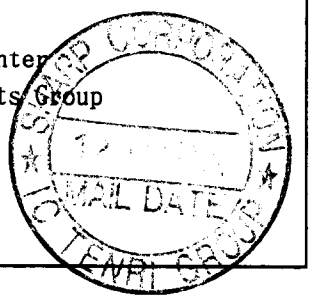
K. MISAWA
Dept. General Manager

REVIEWED BY: T. Nakajima

PREPARED BY: I. Baba

Development Dept. 3
Logic IC Engineering Center
Tenri Integrated Circuits Group
SHARP CORPORATION



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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.

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

CONTENTS

1. GENERAL

1 General

LZ2324HJ is a 1/3 type (6.0mm) solid state imaging device consisting of PN phote-diodes and CCDs(charge-coupled devices). Having about 320,000 pixels (horizontal 542 × vertical 582), it allows a stable B/W image to be obtained at high resolution.

2 Features

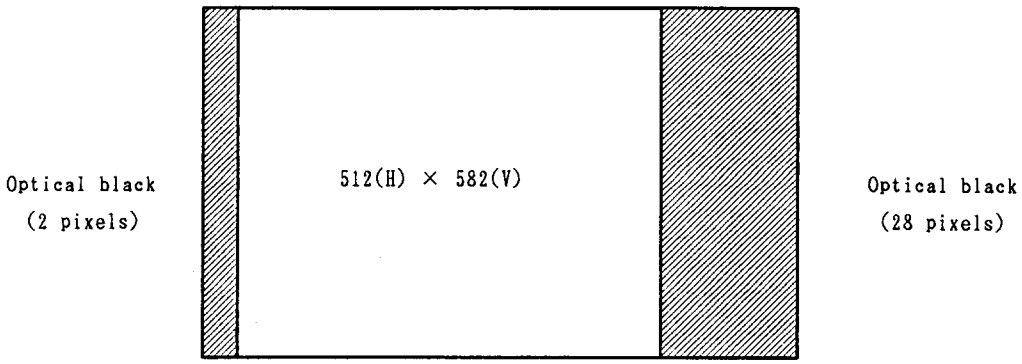
1) Number of video picture elements : Horizontal 512 × vertical 582
   Pixel pitch : Horizontal 9.6 μm × vertial 6.3 μm
   Number of optically black pixel : Horizontal; front 2 and rear 28
2) Reduced fixed pattern noise and lag
3) No sticking and no image distortion
4) Blooming suppression structure
5) Built-in output amplifier
6) 16-pin shrink DIP
   (Row space: 12.70 mm)
7) Variable electronic shutter(1/50 to 1/10000 s)
8) N-type silicon substrate N-MOS process
9) Not designed or rated as radiation hardened
10) Compatible with CCIR standard

3 Applications

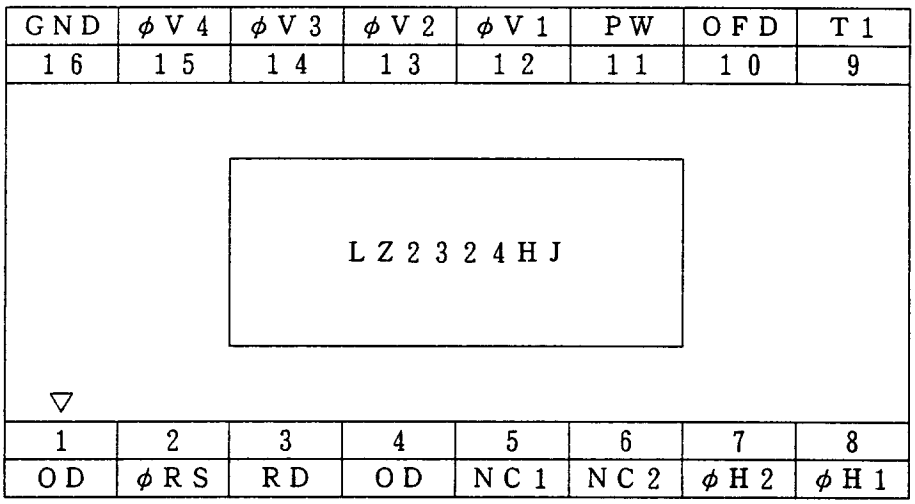
1) Cameras(Cam corders, industrial monitor cameras, etc.)
2) Pattern recognition

※ 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



3. PIN IDENTIFICATION



(TOP VIEW)

Symbol	Pin name
RD	Reset transistor drain
OD	Output transistor drain
OS	Video output
φRS	Reset transistor clock
φV1, φV2, φV3, φV4	Vertical shift register clock
φH1, φH2	Horizontal shift register clock
OFD	Overflow drain
PW	P well
GND	Ground
T1	Test Pin
NC1, NC2	Non connection (note 1)

(note 1)Connect each pin to GND directly or through a capacitor large than 0.047μF.

4. ABSOLUTE MAXIMUM RATINGS

(Ta = 25℃)

Parameter	Symbol	Ratings	Unit
Output transistor drain voltage	VOD	0 ~ +18	V
Reset drain voltage	VRD	0 ~ +18	V
Overflow drain voltage	VOFD	0 ~ +55	V
Test terminal, T1	VT1	0 ~ +18	V
Reset gate clock voltage	VφRS	−0.3 ~ +18	V
Vertical shift register clock voltage	VφV	−9.0 ~ +18	V
Horizontal shift register clock voltage	VφH	−0.3 ~ +18	V
Voltage difference between Pwell and clock	VPW-Vφ	−27 ~ 0	V
Storage temperature	Tstg	−40 ~ +85	℃
Operating ambient temperature	Topr	−20 ~ +70	℃

5. RECOMMENDED OPERATING CONDITIONS

Parameter		Symbol	Minimum	Typical	Maximum	Unit
Operating ambient temperature		Topr		25.0		℃
Output transistor drain voltage		VOD	14.5	15.0	16.0	V
Reset transistor drain voltage		VRD		VOD		V
Overflow drain voltage	When DC is applied (note1)	VOFD	5.0		19.0	V
	When pulse is applied p-p level (note2)	$V\phi_{OFD}$	21.5			V
Ground		GND		0.0		V
P well voltage		VPW	-9.0		VφVL	V
Test terminal, T1		VT1		VOD		V
Vertical shift resistor clock LOW level		VφV1L, VφV3L VφV2L, VφV4L	-8.5	-8.0	-7.5	V
Vertical shift register clock INTERMEDIATE level		VφV1I, VφV3I VφV2I, VφV4I		0.0		V
Vertical shift resistor clock HIGH level		VφV1H, VφV3H	14.5	15.0	17.0	V
Horizontal shift resistor clock LOW level		VφH1L, VφH2L	-0.05	0.0	0.05	V
Horizontal shift register clock HIGH level		VφH1H, VφH2H	4.5	5.0	6.0	V
Reset gate clock LOW level		VφRSL	0.0		VOD-13.0	V
Reset gate clock HIGH level		VφRSH	VOD-8.5		9.5	V
Vertical shift register clock frequency		fφV1, fφV2 fφV3, fφV4		15.63		kHz
Horizontal shift register clock frequency		fφH1, fφH2		9.66		MHz
Reset gate clock frequency		fφRS		9.66		MHz

(note1) When DC voltage is applied, shutter speed is 1/50 second.

(note2) When pulse is applied, shutter speed is less than 1/50 second.

※ To apply power, first connect GND and then turn on OFD. After turning on OFD, turn on PW first and then turn on other powers and pulses.

Do not connect the device to or disconect it from the plug socket while power is being applied.

6. CHARACTERISTICS (Drive method : Field accumulation)

Ambient temperature : +25℃, but +60℃ for parameter No.4 and 5.
Operating conditions : the typical values specified in recommended conditions.
Color Temperature of light source : 3200K / IR cut-off filter(CM-500, 1mmt) is used.

No.	Parameter	Symbol	Note	Minimum	Typical	Maximum	Unit
1	Standard output voltage	Vo	(a)		150		mV
2	Photo response non-uniformity	PRNU	(b)(c)			10	%
3	Saturation output voltage	Vsat	(b)(d)	650			mV
4	Dark output voltage	Vdark	(e)		0.3	3.0	mV
5	Dark signal non-uniformity	DSNU	(b)(f)		0.6	2.0	mV
6	Sensitivity	R	(g)	500	700		mV
7	Smear ratio	SMR	(h)(i)		0.003	0.016	%
8	Image lag	AI	(j)			1.0	%
9	Blooming suppression ratio	ABL	(h)(k)	100			
10	Current dissipation	IOD			4.0	8.0	mA
11	Output impedance	Ro			350		Ω

• VOFD is adjusted to the minimum voltage with that ABL satisfy the specification or to the value displayed on the device.

【Note】

(a) The average output voltage under the uniform illumination. The standard exposure condition is defined when Vo is 150 mV.

(b) The image area is divided into 10 × 10 segments. The segment's voltage is the average output voltages of all pixels within the segment.

(c) PRNU is defined by (Vmax - Vmin) / Vo, where Vmax and Vmin are the maximum and the minimum values of each segment's voltage respectively, under the standard exposure condition.

(d) The minimum segment's voltage under 10 times exposure of the standard exposure condition.

(e) The average output voltage under the non-exposure condition.

(f) DSNU is defined by (Vdmax - Vdmin), where Vdmax and Vdmin are the maximum and the minimum values of each segment's voltage respectively, under the non-exposure condition.

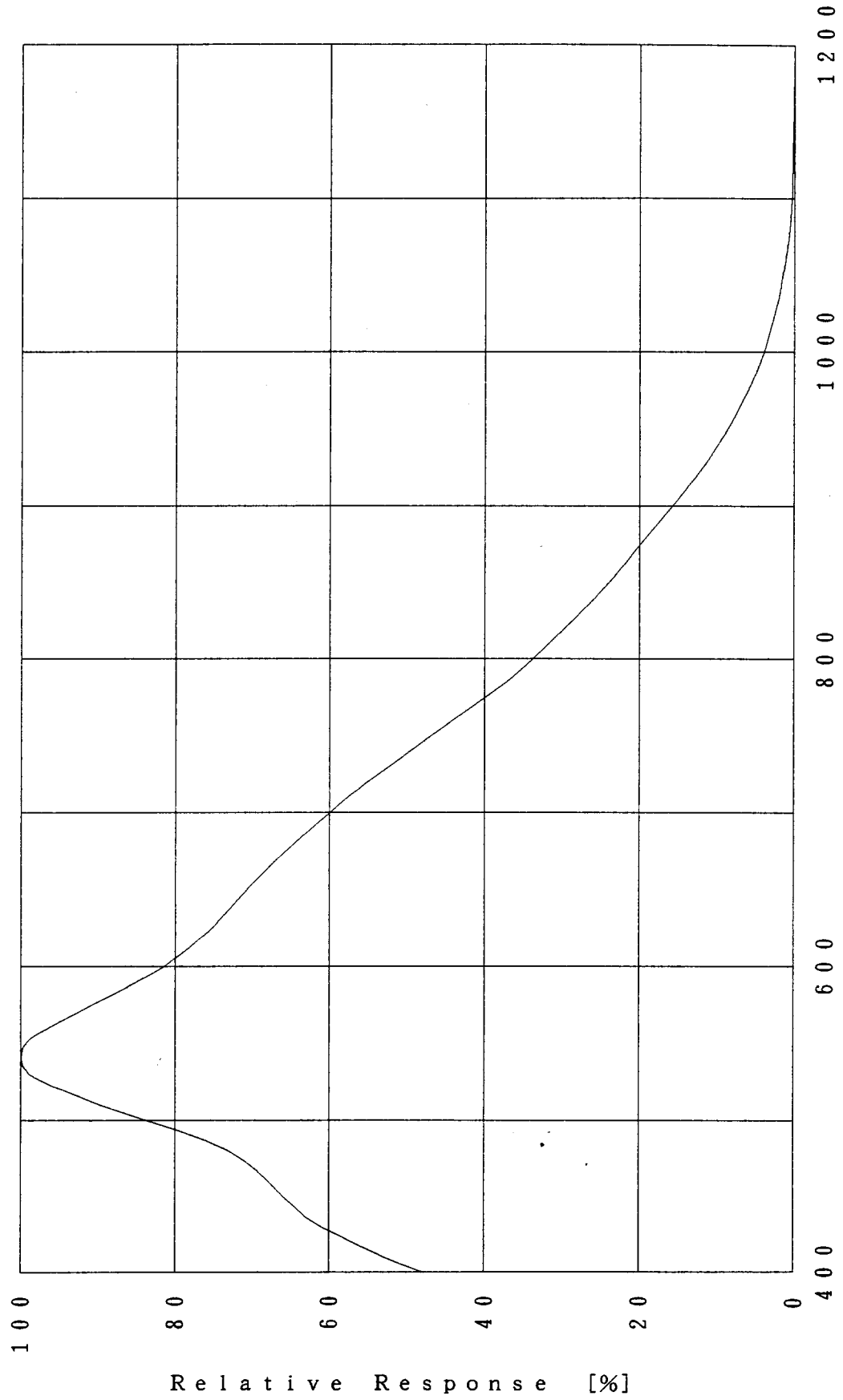
(g) The average output voltage when a 1000 lux light source with a 90% reflector is imaged with a lens at F4, f50 mm.

(h) The sensor is exposed only in the central area of V/10 square, where V is the vertical image size.

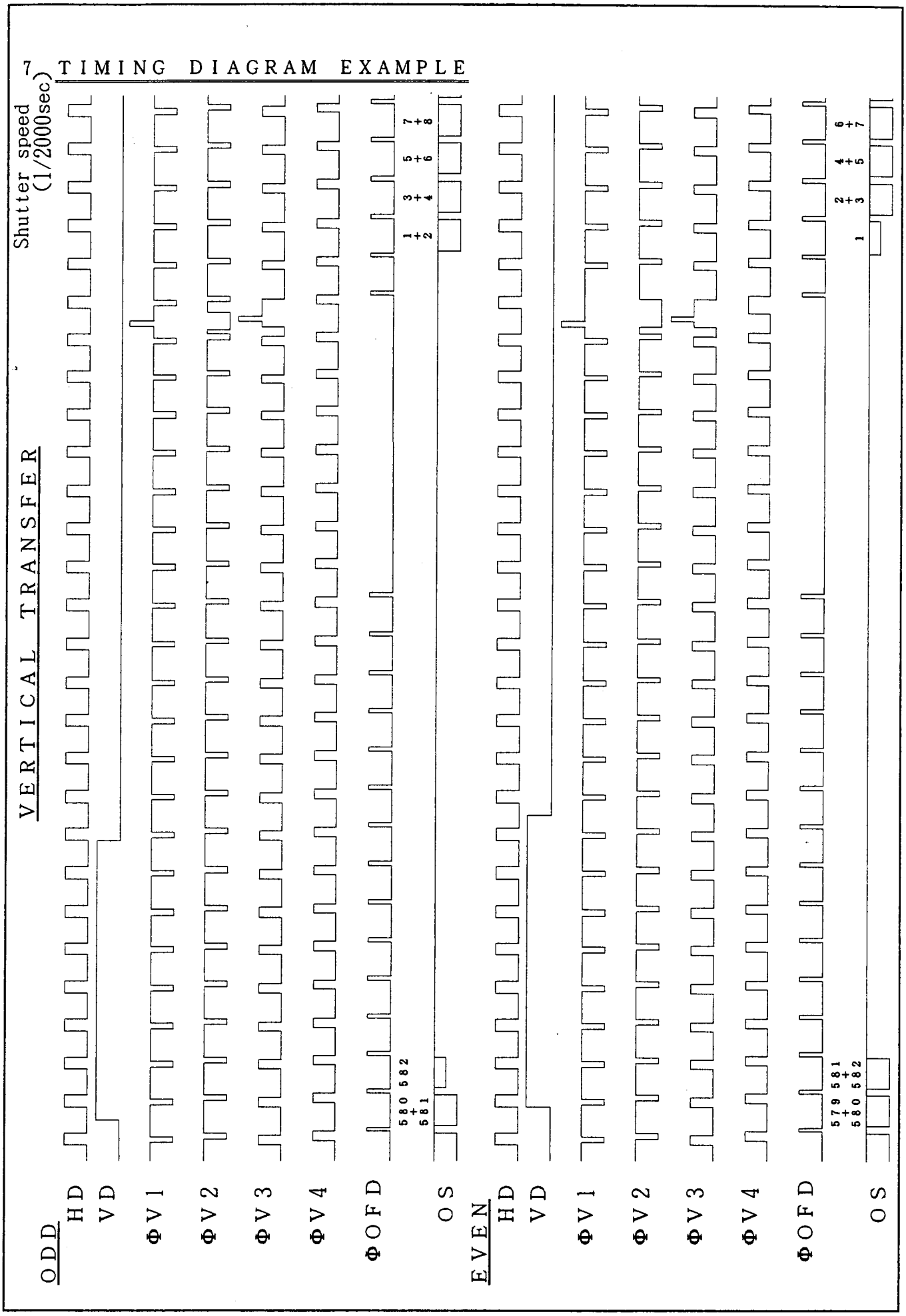
(i) SMR is defined by the ratio of the smear voltage detected during the vertical blanking period to the maximum output voltage in the V/10 square, with a lens at F4.

(j) The sensor is exposed at the exposure level corresponding to the standard condition. AI is defined by the ratio of the lag voltage measured at the 1st field during the non-exposure period to the standard output voltage.

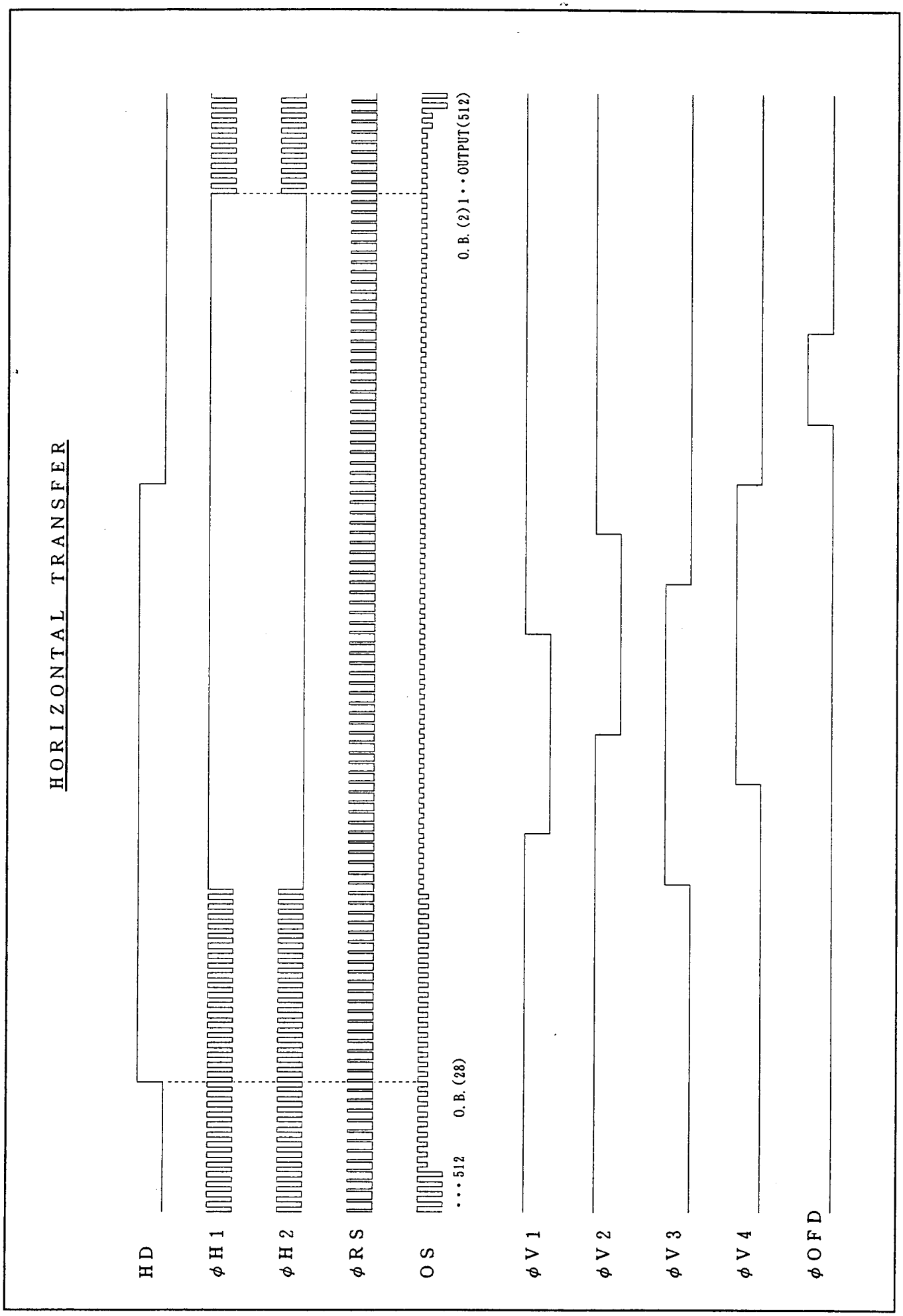
(k) ABL is defined by the ratio of the exposure at the standard condition to the exposure at a point where a blooming is observed.

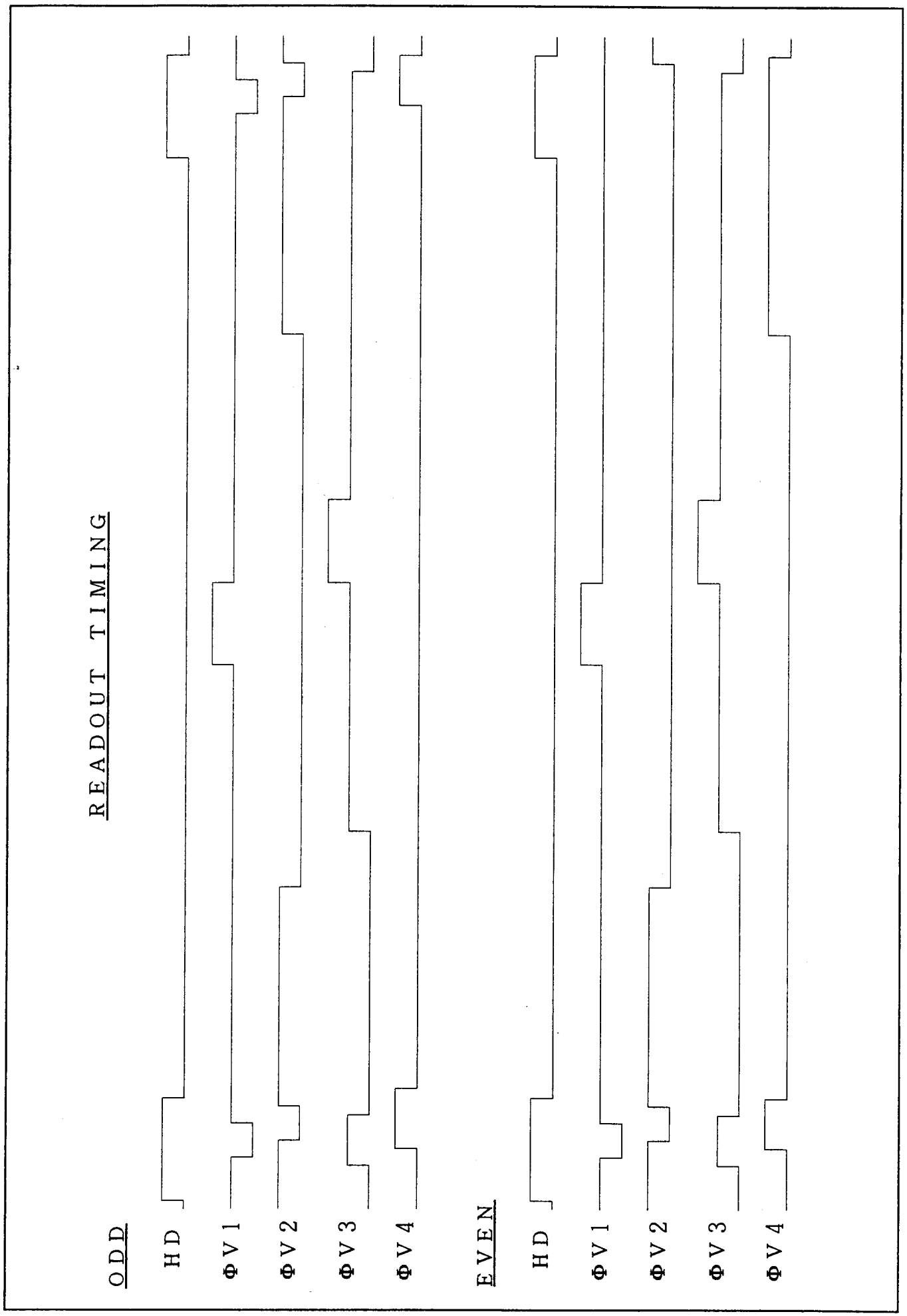

Spectral Response Example
Wave length [nm]
400
600
800
1000
1200
Relative Response [%]
0
20
40
60
80
100

7 TIMING DIAGRAM EXAMPLE

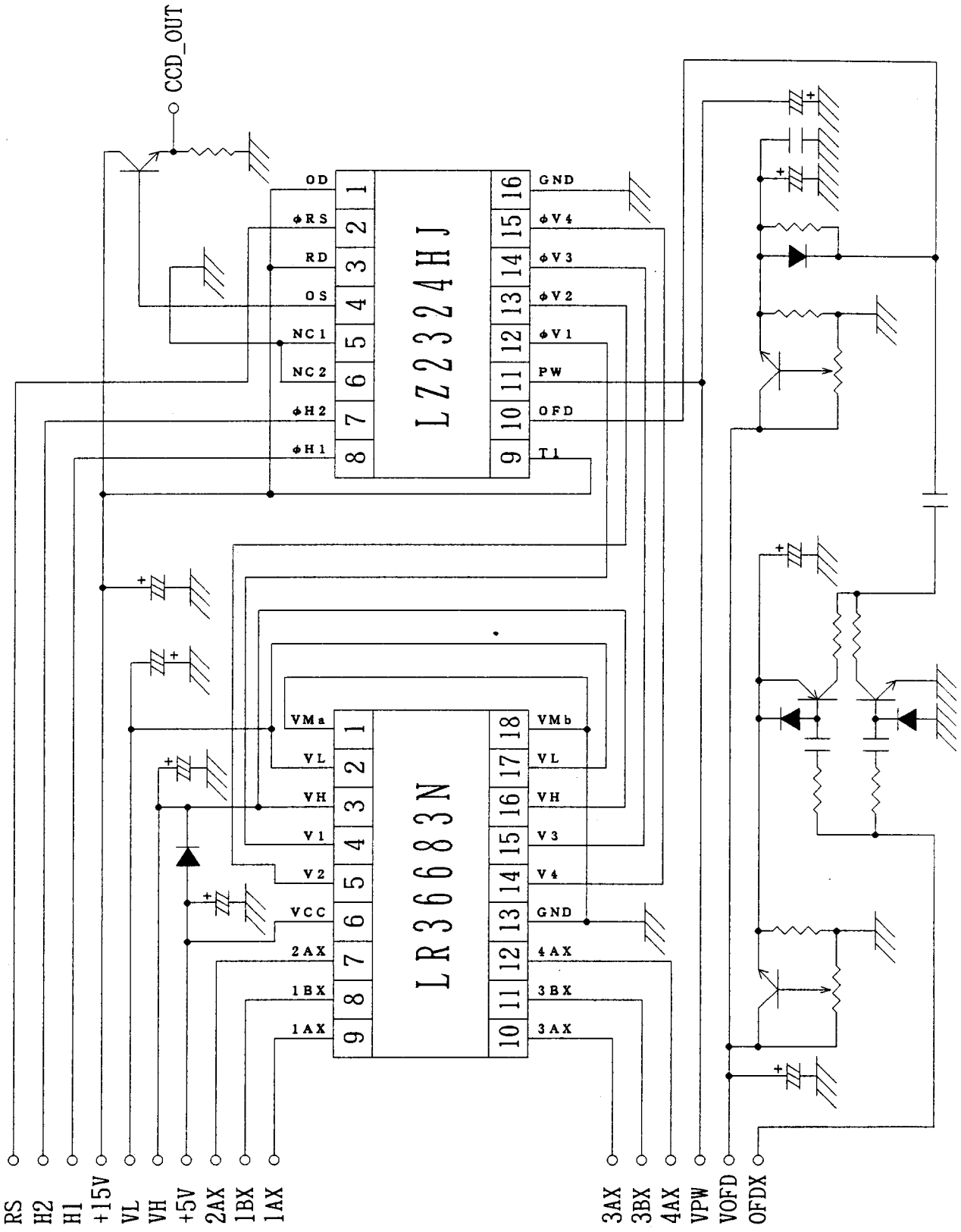


HORIZONTAL TRANSFER




READOUT TIMING
ODD
HD
ΦV1
ΦV2
ΦV3
ΦV4
EVEN
HD
ΦV1
ΦV2
ΦV3
ΦV4

8. STANDARD OPERATING CIRCUIT EXAMPLE



9. SPECIFICATION FOR BLEMISH

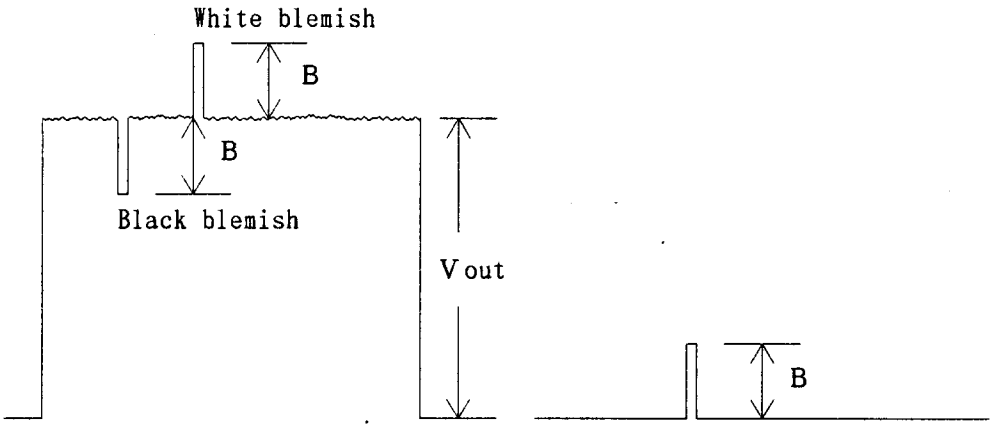
1) Definition of blemish

	Level of blemish (mV)	Permitted number of blemish	Comment
White blemish (Exposed)	12 ≦ B	M	• See fig. 9(a) • Vout = 85 mV
	B < 12	no count	
Black blemish (Exposed)	12 ≦ B	N	
	B < 12	no count	
White blemish (Non_exposed)	6 ≦ B	0	• See fig. 9(b)
	B < 6	no count	
White blemish (Shutter mode)	4.5 ≦ B	0	• See fig. 9(a) • Vout = 15 mV • The electronic shutter speed is set at 1/10000 sec.
	B < 4.5	no count	
Black blemish (Shutter mode)	4.5 ≦ B	0	
	B < 4.5	no count	

《note》
- B : Blemish level defined in fig. 9.
- Vout : Average output voltage

2) Measuring Condition

- Ta : 60 ℃
- Measuring Area : All pixels in the image and the optical black area excluding the outer 2 pixels of the left and right sides and the outer 2 lines of the upper and lower sides in the image area.



(a) Exposed (b) Non_exposed

fig. 9 Definition of blemish level

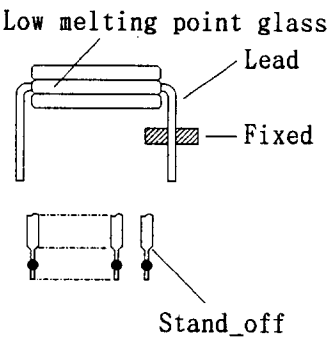
10. CAUTIONS FOR USE

1. Package Breakage

In order to prevent the pakage from being broken, observe the following instructions:

1) The CCD is a precise optical component and the package material is ceramic. Therefore,
   - 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 socket and the circuit board, small shock could break the package more easily than when the package isn't fixed.

2) When applying force for mounting the device or any other purposes, fix the leads between a joint and a stand_off, so that no stress will be given to the jointed part of the lead. In addtion, when applying force, do it at a point below the stand_off part.
   --- The leads of the package are fixed with low melting point glass, so stress added to a lead could cause a crack in the low melting point glass in the jointed part of that lead.



3) When mounting the package on the housing, be sure that the package is not bent.
   --- If a bent package is forced into place between a hard plate or the like, the package may be broken.

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

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

2. Electroastatic damage

As compared with general MOS-LSI, CCD has lower ESD.
Therefore, please take the following anti-static measures when handling the CCD:

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 1 Meg ohm between the human body and the ground to be on the safe side.
2) When directly handling the device with fingers, hold the part without leads and do not touch any lead.
3) To avoid generating static electricity,
   a. do not scrub the glass surface with cloth or plastic
   b. do not attach any tape or labels
   c. do not clean the glass surface with dust-cleaning tape
4) When storing or transporting the device, put it in a container of conductive material.

3. Dust and contamination

Dust or contamination on the glass surface could deteriorate the output characteristic or cause a scar. In order to minimize dust or contamination on the glass surface, take the following precautions:

1) Handle CCD in a clean environment such as a cleaned booth.
(The cleanliness level should be, if possible, class 1000 at least.)
2) Do not touch the glass surface with fingers. If dust or contamination gets on the glass surface, the following cleaning method is recommended:
- 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 glass surface 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.

※ Note: In most cases, dust and contamination are unavoidable, even before the device is first used. It is, therefore, recommend that the above procedures should be taken to wipe out dust and contamination before using the device.

4. Other

1) Soldering should be manually performed within 5 seconds at 350℃ maximum at soldering iron.
2) Avoid using or storing the CCD at high temperature or high humidity as it is a precise optical component. Do not give a mechanical shock to the CCD.
3) The exit pupil position of lens should be more than 20mm from the top surface of CCD.

11 PACKAGE OUTLINE AND PACKING SPECIFICATION

1. Package Outline Specification

Refer to drawing No. GDG016L-0FE2.

(The seal resin stick out from the package shall be passed. And, the seal resins are two kinds of colors, white and transparency.)

2. Markings

Marking contents

(1) Product name : LZ2324HJ

(2) Campany name : SHARP

(3) Country of origin : JAPAN

(4) Date code : YY WW X XX

- XX — Denotes the production ref. code. (1~2 figures)
- X — Denotes the production day of the week.

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

- WW — Denotes the production week. (01, 02, 03, ·····, 52, 53)
- YY — Denotes the production year. (Lower two digits of the year.)

(5) Over flow drain voltage : EE — Denotes the corresponding code of over flow drain voltage.

Positions of markings are shown in the package outline drawing(No. GDG016L-0FE2). But, markings shown in that drawing are not provided any measurements of their characters and their positions.

3. Packing Specification

3-1. Packing materiales

Material Name	Material Spec.	Purpose
Device case	Paper (100devices/case)	Device packing (2trays/case)
Device tray	Conductive plastic (50devices/tray)	Device fixing
Cover tray	Conductive plastic (1tray/case)	Device covering
Buffer	Cardboard (1sheet/case)	Shock absorber of device tray
Plastic film bag	Plastic film	Device tray fixing
Air cushion	Plastic film	Shock absorber of device case
Tape	Plastic film	Sealing Plastic film bag

3-2. External appearance of packing

Refer to drawing No. KSEC-100T2-0.

4. Precaution

1) Before unpacking, confirm the imports of the chapter "Handling Precaution" 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.

3) Printer's ink of over flow drain voltage isn't solvent-proof, so it is possible to be defaced by using a solvent.

5. Corresponding code of over flow drain voltage

Contents of the corresponding code

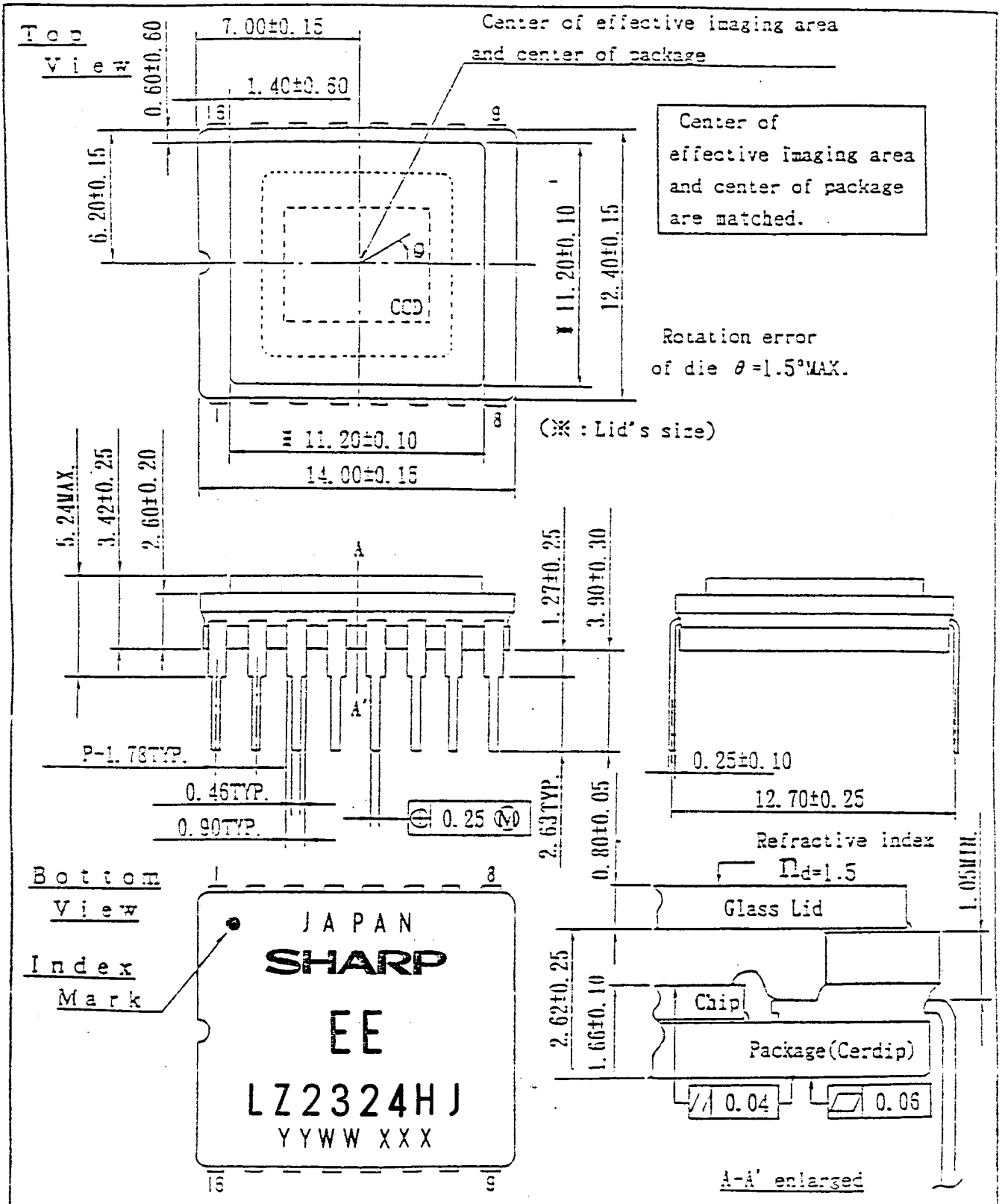
Numerical value of over flow drain voltage (V) (Down to one decimal place)		Corresponding code of over flow drain voltage (English alphabet and numeral of two figures)	
Integral value	3.	One figure	3
	4.		4
	5.		5
	6.		6
	7.		7
	8.		8
	9.		9
	10.		A
	11.		B
	12.		C
	13.		D
	14.		E
	15.		F
	16.		G
	17.		H
	18.		J
	19.		K
	20.		L
Decimal value	.0	Two figures	0
	.1		1
	.2		2
	.3		3
	.4		4
	.5		5
	.6		6
	.7		7
	.8		8
	.9		9

Example of the corresponding code

Numerical value of voltage : 9.5(V) → Corresponding code of voltage : 95

14.3(V) → E3

LZ2324HJ

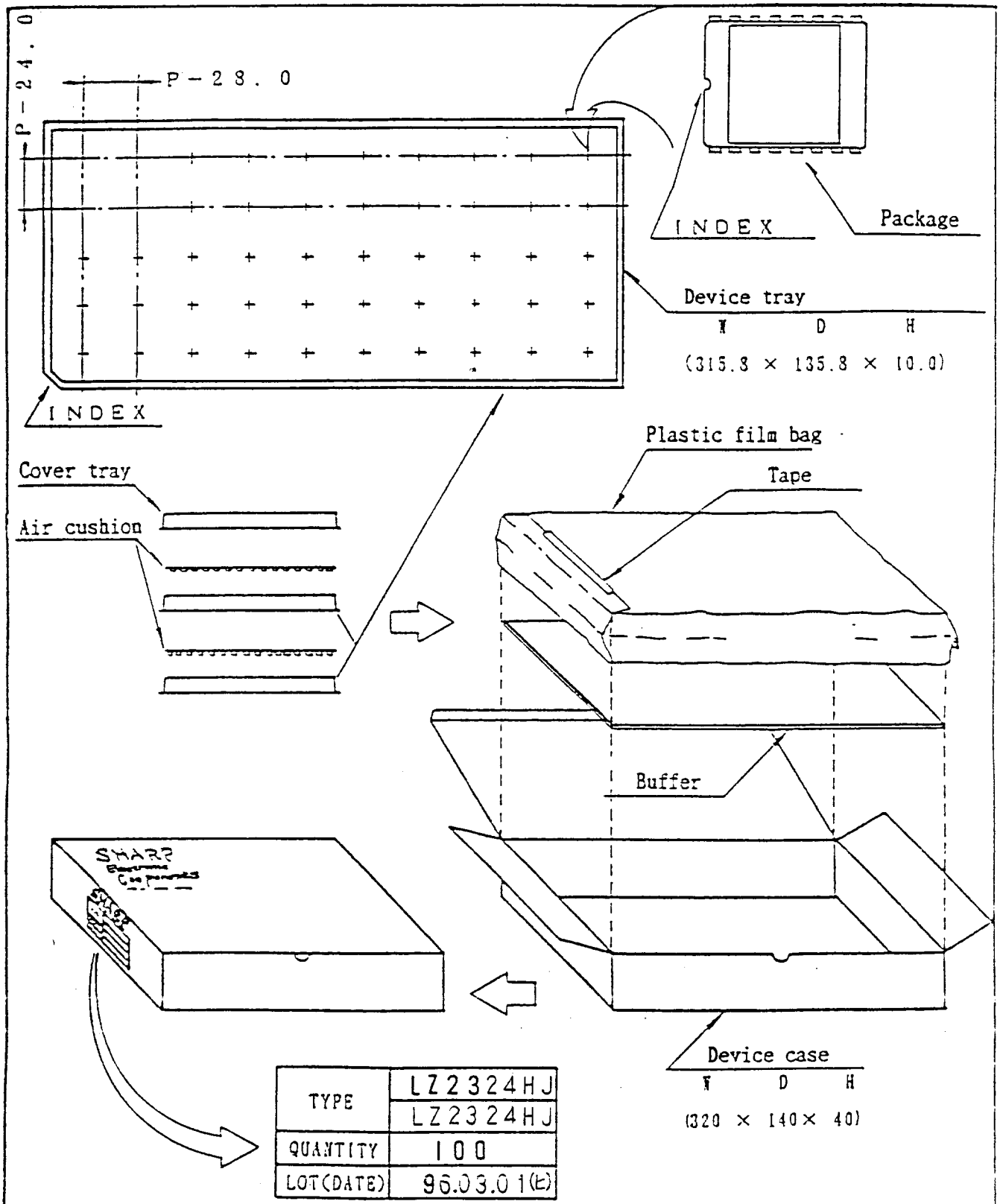


(Unit : mm)

EE : Corresponding code of over flow drain voltage

MATERIAL	FINISH	NAME DMPG16C
IC GROUP		CODE
ASSEMBLY ENGINEERING DEPT. SHARP CORPORATION		DRAWING No. GDG016L-0FE2

LZ2324HJ



TYPE	LZ2324HJ
	LZ2324HJ
QUANTITY	100
LOT(DATE)	96.03.01(E)

尺度 SCALE	単位 UNIT	△ . .	
/	1= /	△ . .	
		改訂日 DATE	改訂記事 REVISE	担当 CHARGE
材質 MATERIAL	仕上 FINISH	名称 NAME	External Appearance of Packing
		コード CODE	
シャープ株式会社 (IC)GROUP			
ASSEMBLY ENGINEERING DEPT. SHARP CORPORATION		図番 DRAWING No.	KSEC-100T2-0