SHARP

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To ;

PRELIMINARY

SPECIFICATIONS

Product Type 1/5 type solid state B/W imaging device for CCIR system

Model No. LZ2548J

※This specifications contains 18 pages including the cover and appendix.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

DATE:

BY:

PRESENTED

BY: K. Misawa
K. MISAWA
Dept. General Manager

REVIEWED BY: T. Nakajima

PREPARED BY: E. Koyama

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

SHARP

LZ2548J

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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

LZ2548J is a 1/5 type (3.6mm) solid state imaging device driven by only 5V single power supply.
Having about 220,000 pixels(horizontal 384 x vertical 582), it allows a stable B/W image.

1 Features

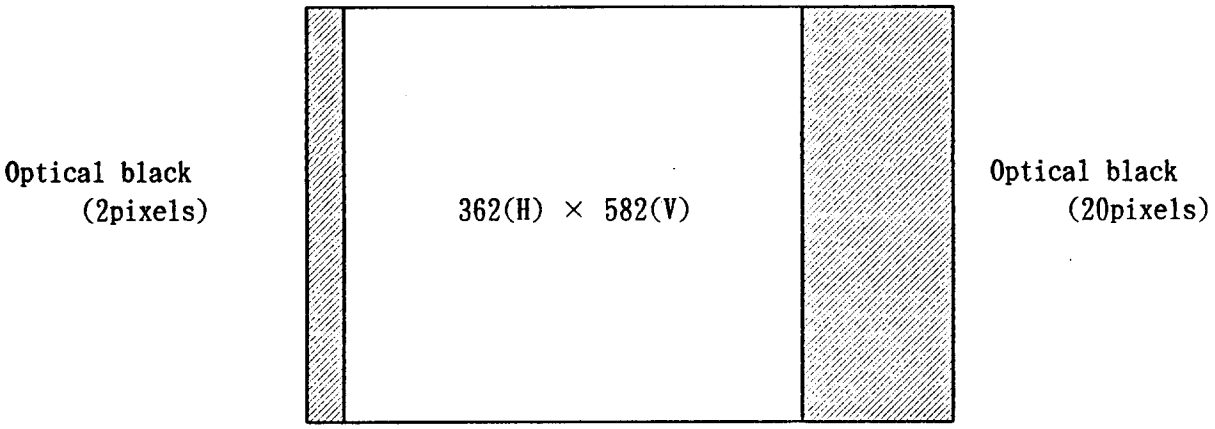
1) Number of video picture elements : Horizontal 362 x vertical 582
   Pixel pitch : Horizontal 8.2 μm x vertical 3.8 μm
   Number of optically black pixel : Horizontal; front 2 and rear 20
2) Reduced fixed pattern noise and lag
3) No sticking and no image distortion
4) Blooming suppression structure
5) Built-in output amplifier, voltage generator, pulse mix circuit
6) 16-pin shrink DIP
   (Row space: 12.70mm)
7) Variable electronic shutter
8) N-type silicon substrate
9) Not designed or rated as radiation hardened
10) Compatible with CCIR standard

2 Applications

1) Multi-media cameras
2) Monitor cameras (TV doorphone, Video phone, etc.)
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. COMPOSITION OF PIXELS



3. PIN ASSIGNMENT AND PIN IDENTIFICATION

GND	VCC	φV4	φV2	φV3	φV1	φTG	VD2
16	15	14	13	12	11	10	9
			LZ2548J				
▽							
1	2	3	4	5	6	7	8
φRS	OS	VD1	OFD	φH2	φH1	LOFX	φOFD

(TOP VIEW)

Symbol	In/Out	Pin name
VCC	Input	Power supply
OS	Output	Video output
GND	Input	Ground
φV1, φV2, φV3, φV4	Input	Vertical shift register gate clock (*1)
VD1, VD2	Output	Voltage-generator output (*2)
φRS	Input	Reset transistor gate clock (*3)
φH1, φH2	Input	Horizontal shift register gate clock
φTG	Input	Transfer gate clock
OFD	Input	Over flow drain (*4)
LOFX	Input	Electronic shutter clock
φOFD	Output	Electronic shutter clock (*5)

(*1)～(*5) : Refer to " 8. STANDARD OPERATING CIRCUIT EXAMPLE (P10)".

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

4. ABSOLUTE MAXIMUM RATING

(Ta = 25℃)

Item	Symbol	Rating	Unit
Power supply	VCC	0 to 7.3	V
Overflow drain voltage	VOFD	0 to 35	V
Reset gate clock p-p level	VφRS	0 to VCC	V
Vertical shift register clock p-p level	VφV	0 to VCC	V
Horizontal shift register clock voltage	VφH	0 to VCC	V
Electronic shutter clock voltage	VLOFX	0 to VCC	V
Transfer gate clock voltage	VφTG	0 to VCC	V
Storage temperature	Tstg	-40 to +85	℃
Operating ambient temperature	Topr	-20 to +70	℃

5. RECOMMENDED OPERATING CONDITIONS

Item		Symbol	Minimum	Typical	Maximum	Unit
Operating ambient temperature		Topr		25.0		℃
Power supply voltage		VCC	4.75	5.0	5.25	V
Overflow drain voltage	When DC is applied	VOFD	4.0	(adjust)	16.0	V
	When pulse is applied p-p level	VφOFD			16.0	V
Ground voltage		GND		0.0		V
Reset gate clock	p-p level	VφRS		VCC		V
Vertical shift register clock	p-p level	VφV1~4		VCC		V
Horizontal shift register clock	LOW level	VφH1~2L		0.0		V
	HIGH level	VφH1~2H		VCC		V
Transfer gate clock	LOW level	VφTGL		0.0		V
	HIGH level	VφTGH		VCC		V
Electronic shutter clock	LOW level	VLOFXL		0.0		V
	HIGH level	VLOFXH		VCC		V
Vertical shift register clock freq.		fφV1~4		15.63		kHz
Horizontal shift register clock freq.		fφH1~2		6.75		MHz
Reset gate clock freq.		fφRS		6.75		MHz

6. CHARACTERISTICS

No.	Item	Symbol	Note	Min.	Typ.	Max.	Unit
1	Photo response non-uniformity	PRNU	(a)			15	%
2	Saturation signal	Vsat	(b)	450			mV
3	Dark output voltage	Vdark	(c)		0.5		mV
4	Dark signal non-uniformity	DSNU	(d)		0.5		mV
5	Sensitivity	R	(e)		250		mV
6	Smear ratio	SMR	(f)		-85		dB
7	Image lag	AI	(g)			1.0	%
8	Blooming suppression ratio	ABL	(h)	1000			
9	Current dissipation	I_{OD}			4.0	8.0	mA
10	Output impedance	Ro			400		Ω

【 Conditions 】

- Drive method : Field accumulation.
- DC and AC conditions : the typical values under the recommended operating conditions.
- Ta : +25℃, but +60℃ for Item No. 3 and 4.
- Temperature of light source : 3200 K.
  Infrared absorbing filter (CM-500, 1 mm) is used.

【 Notes 】

- The standard output voltage is defined as 150 mV by the average output voltage under uniform illumination.
- The standard exposure level is defined when the average output voltage is 150 mV under uniform illumination.

(a) The image area is divided into 10 × 10 segments. The voltage of a segment is the average of output voltage from all the pixels within the segment. PRNU is defined by (Vmax - Vmin) / Vo, where Vmax and Vmin are the maximum and the minimum values of each segment's voltage respectively, when the average output voltage Vo is 150 mV.

(b) The image area is divided into 10 × 10 segments. The saturation signal is defined as the minimum of each segment's voltage which is the average of output voltage from all the pixels within the segment, when the exposure level is set as 10 times, compared to standard level.

(c) The average output voltage under a non-exposure condition.

(d) The image area is divided into 10 × 10 segments. DSNU is defined by (Vdmax - Vdmin) under the non-exposure condition where Vdmax and Vdmin are the maximum and the minimum values of each segment's voltage, respectively, that is the average output voltage over all pixels in the segment.

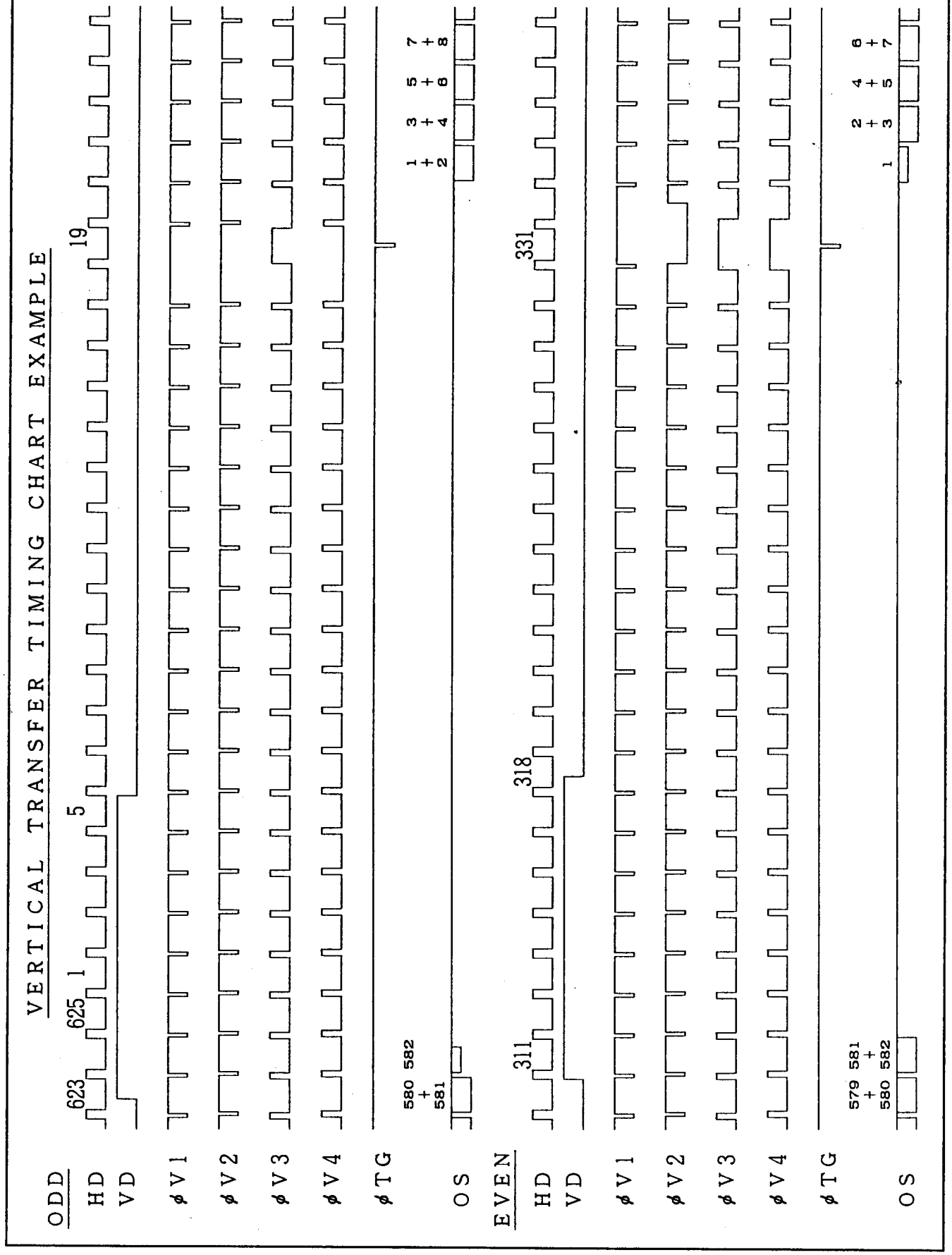
(e) The average output voltage when a 1000 lux light source attached with a 90% refrector is imaged by a lens of F4, f50 mm.

(f) The sensor is adjusted to position a V/10 square at the center of image area where V is the vertical length of the image area. SMR is defined by the ratio of the output voltage detected during the vertical blanking period to the maximum of the pixel voltage in the V/10 square.

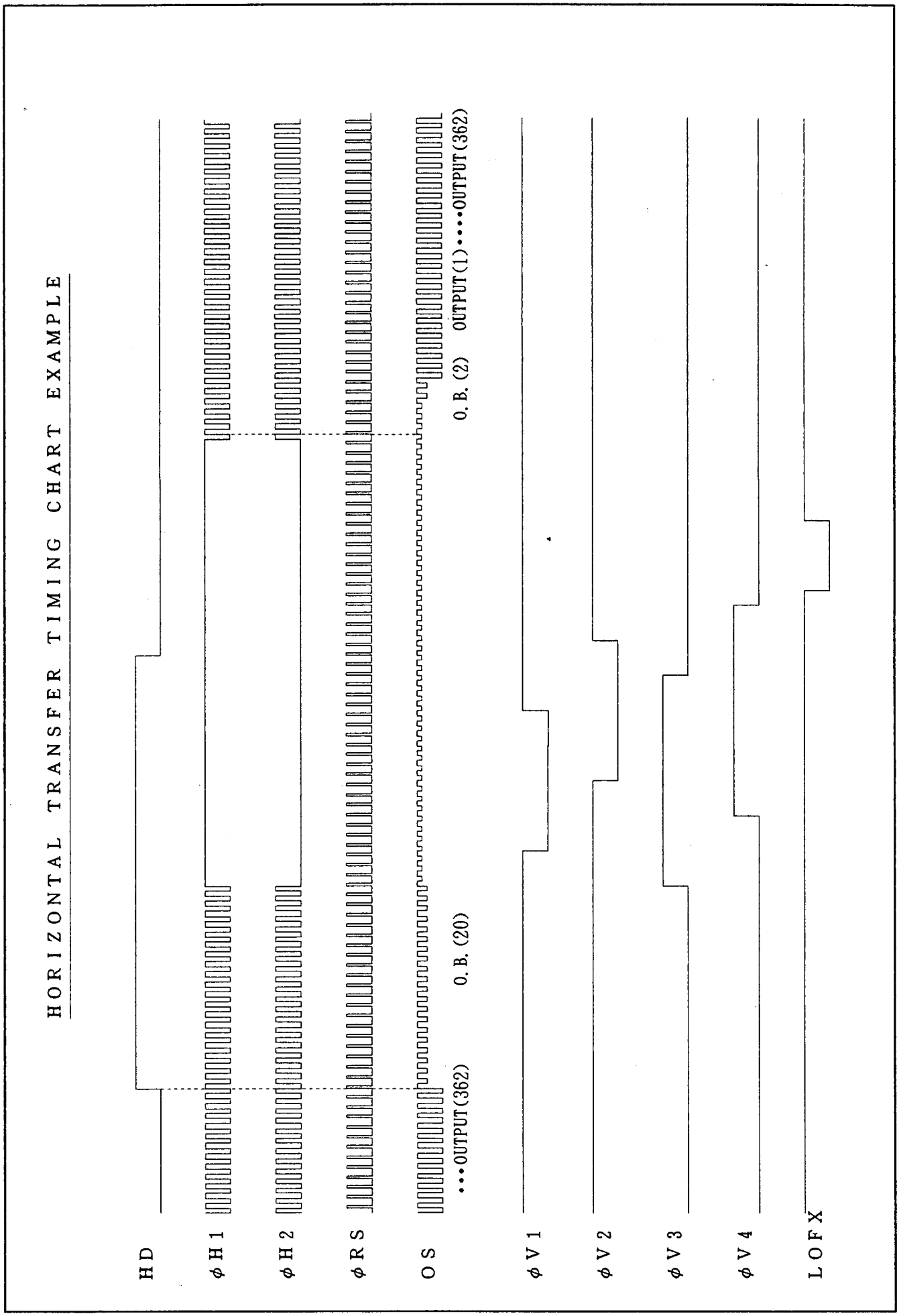
(g) The sensor is exposed at the exposure level corresponding to the standard condition preceding non-exposure condition. AI is defined by the ratio between the output voltage measured at the 1st field during the non-exposure period and the standard output voltage.

(h) The sensor is adjusted to position a V/10 square at the center of image area. ABL is the ratio between the exposure at the standard condition and the exposure at a point where a blooming is observed.

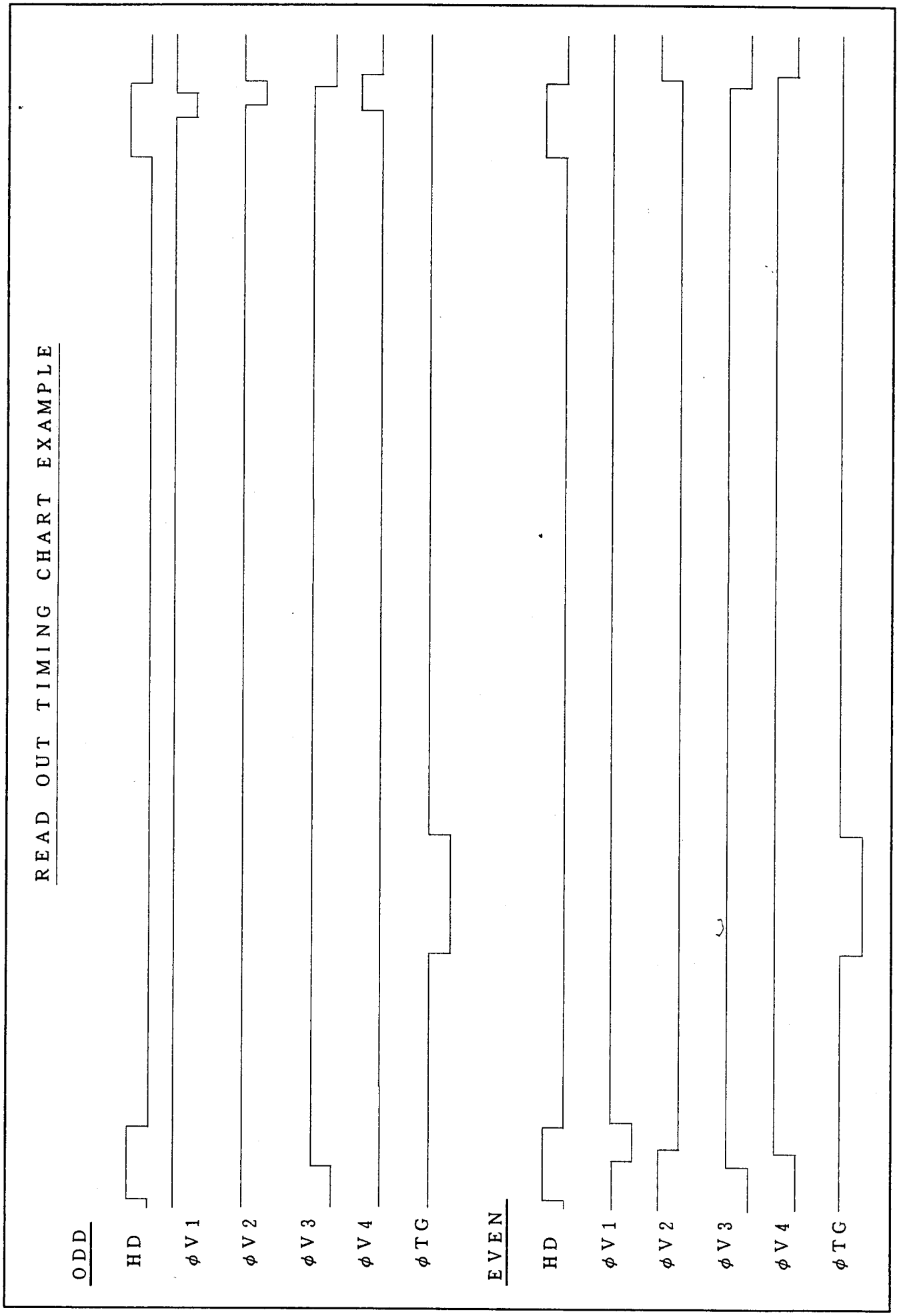
7. TIMING DIAGRAM EXAMPLE



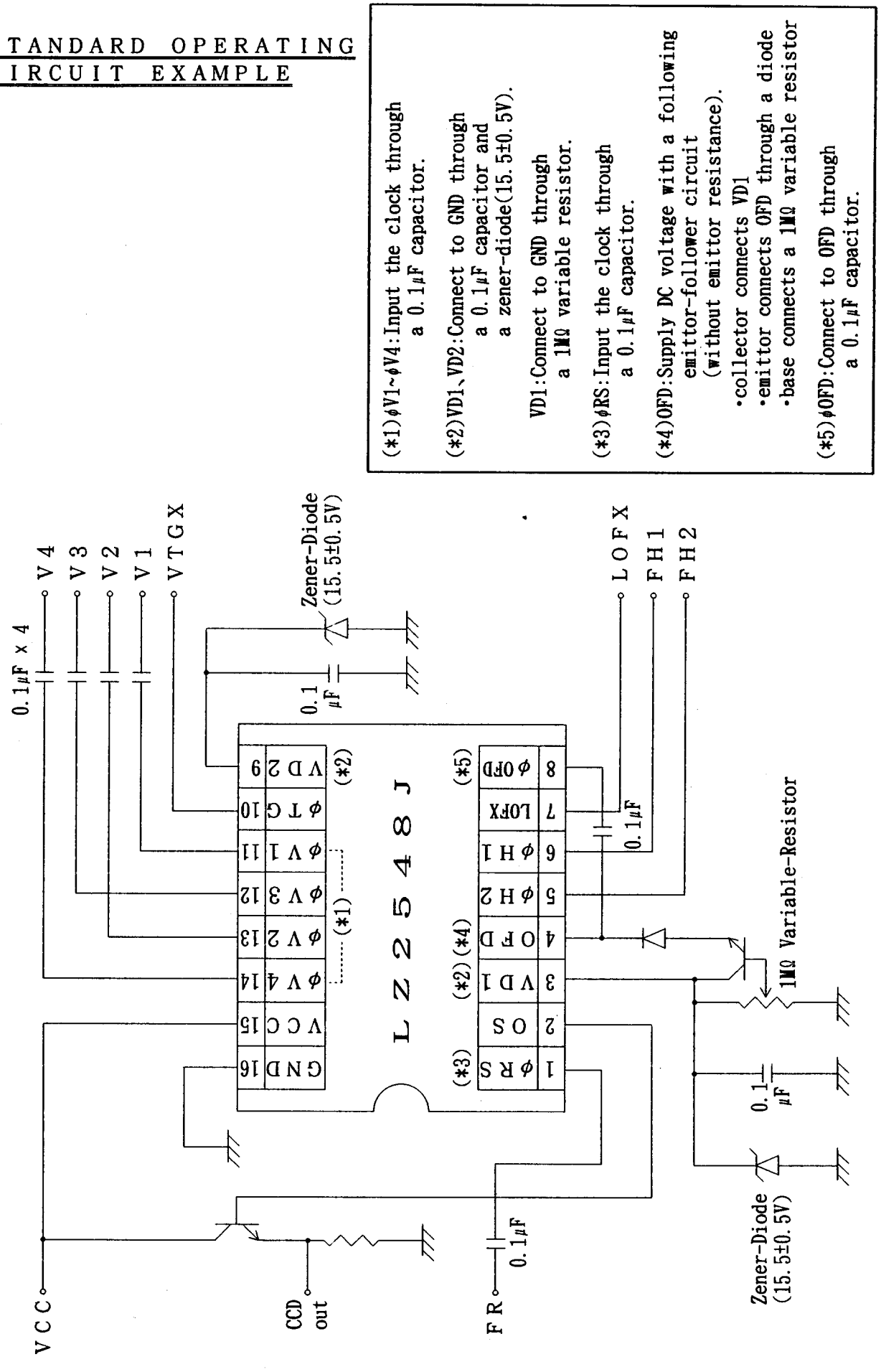
HORIZONTAL TRANSFER TIMING CHART EXAMPLE



READ OUT TIMING CHART EXAMPLE



8. STANDARD OPERATING CIRCUIT EXAMPLE



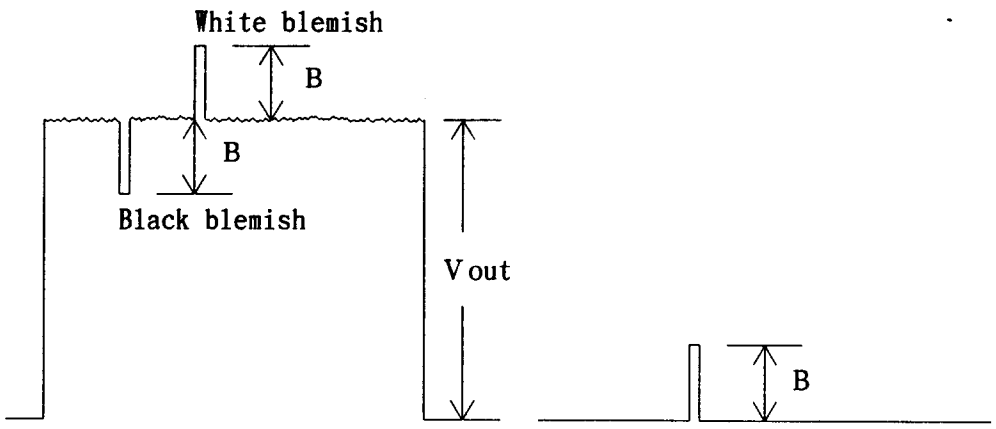
9. SPECIFICATION FOR BLEMISH

1) Definition of blemish

Blemish	Level of blemish (mV)	Permitted number of blemish	COMMENT
White blemish(Ⅰ) (Exposed)	12 ≦ B	0	• B is defined in fig. 9(a). • Vout = 75mV.
	B < 12	no count	
Black blemish(Ⅰ) (Exposed)	12 ≦ B	0	
	B < 12	no count	
White blemish(Ⅱ) (Non-exposed)	10 ≦ B	0	• B is defined in fig. 9(b). • Non-exposure condition.
	B < 10	no count	
White blemish(Ⅲ) (Shutter mode)	4.5 ≦ B	0	• B is defined in fig. 9(a). • Vout = 15 mV. • The electronic shutter speed is set at 1/10000 s
	B < 4.5	no count	
Black blemish(Ⅲ) (Shutter mode)	4.5 ≦ B	0	
	B < 4.5	no count	

B :Blemish level defined in fig. 9.
Vout :Average output voltage

2) Measuring condition
1. Operating temperature : 60℃
2. Measuring area : Measurement excludes the outer 10 pixels; includes the optical black pixels.



(a) Exposed (b) Non-exposed

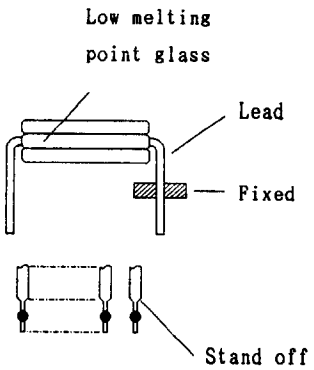
fig. 9 Definition of the blemish level

10. CAUTIONS FOR USE

10.1 Package Breakage

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

1) The CCD is a precision 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 addition, 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.
   Example for mounting
   * Place the buffers between the package and the housing.
   * Keep the bottom side of the package free.



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.

10.2 Electrostatic 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.

10.3 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 shou, ld be wiped off with a clean applicator soaked in Isopropyl alcohol. Wipe slowly and gently in one direction only.
••• Frequently replace the applicater 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, recommended that the above procedures should be taken to wipe out dust and contamination before using the device.

10.4 Cautions

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 precision optical component. Do not give a mechanical shock to the CCD.
3) Do not connect the device to or disconnect it from the plug socket while power is being applied.

11 PACKAGE OUTLINE AND PACKING SPECIFICATION

1. Package Outline Specification

Refer to drawing No. GDG016J-03E0.

(The seal resin stick out from the package shall be passed.)

2. Markings

Marking contents

(1) Product name : LZ2548J

(2) Campany name : SHARP

(3) Country of origin : JAPAN

(4) Date code : YY WW X XX

Denotes the production ref. cord. (1~2 figures)

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(No. GDG016J-03E0). 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

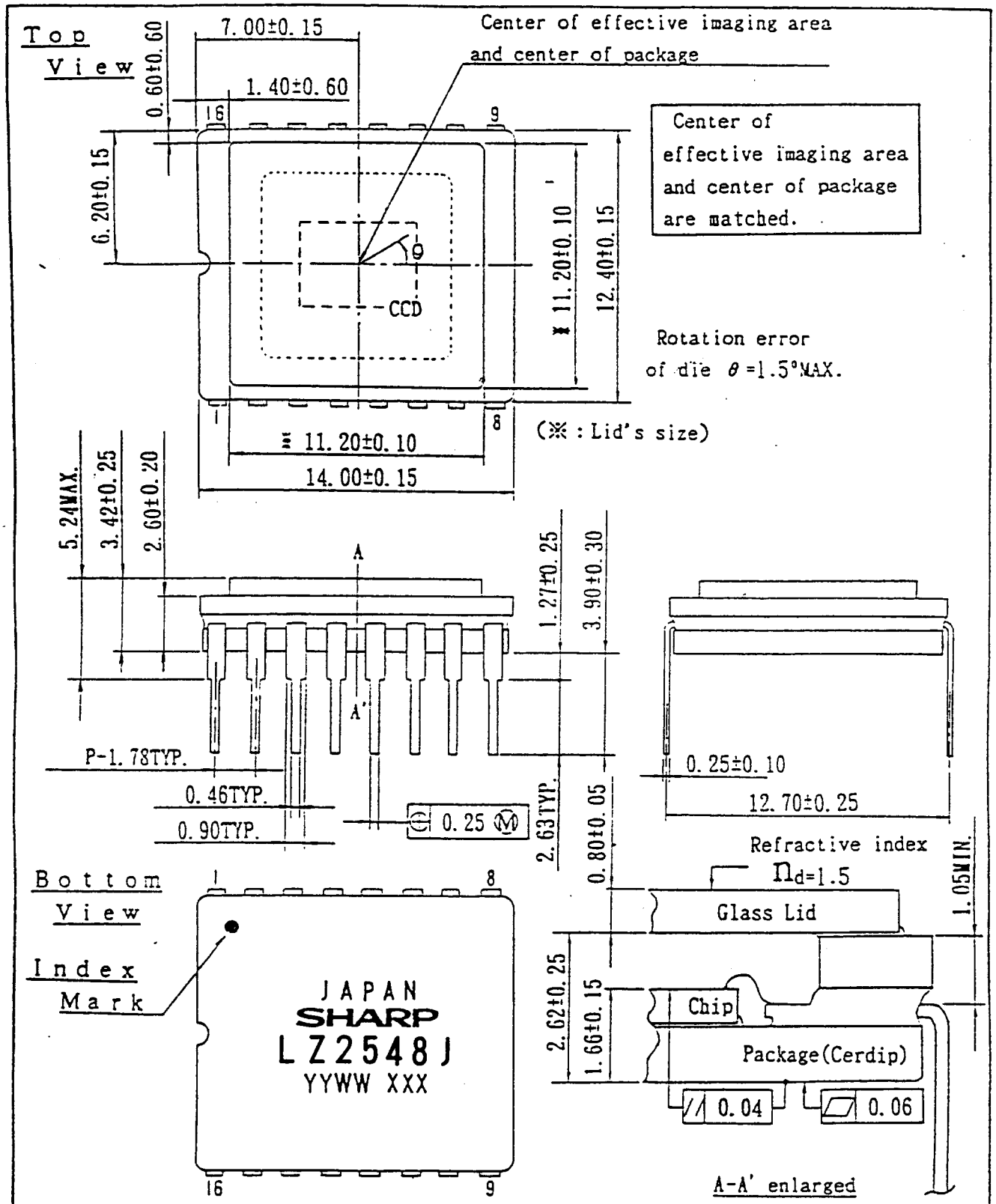
Refer to drawing No. KSEC-100T2-0.

4. Precaution For Unpacking

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.

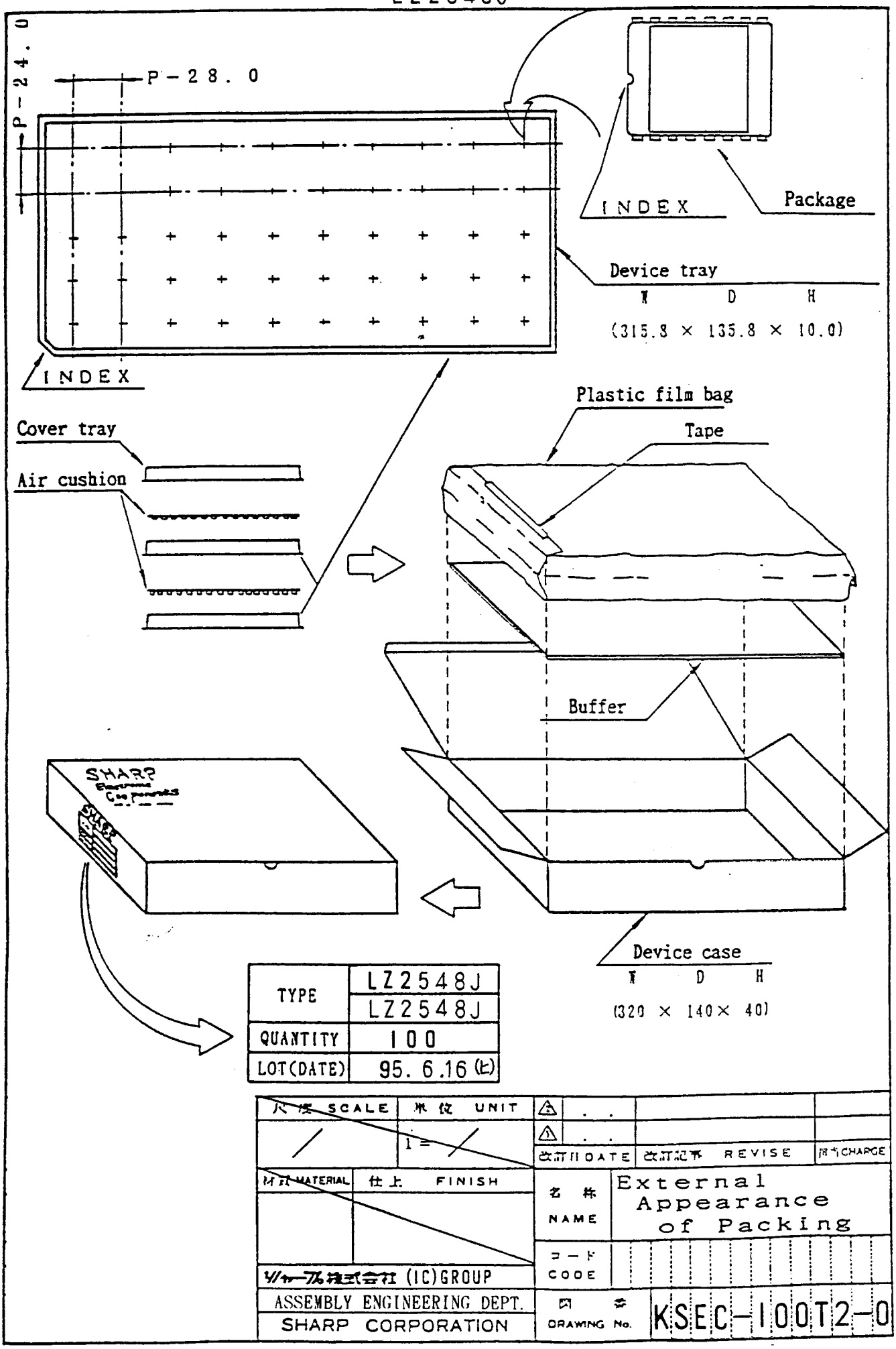
ISSUE DATE	95. 06. 16	T. Mark	Y. Takeda	T. Seko	(NOTE)
ISSUE NUMBER	56162ADC				
S/C NUMBER	LZ2548J				



(Unit : mm)

MATERIAL	FINISH	NAME DMPG16C
		CODE
IC GROUP		
ASSEMBLY ENGINEERING DEPT.		DRAWING No. GDG016J-03E0
SHARP CORPORATION		

LZ2548J



TYPE	LZ2548J
	LZ2548J
QUANTITY	100
LOT(DATE)	95.6.16 (土)

尺度 SCALE / 1=	単位 UNIT	改訂 DATE	改訂記事 REVISE / 担当 CHARGE
材料 MATERIAL	仕上 FINISH	名称 NAME	External Appearance of Packing
		コード CODE	
システム株式会社 (IC)GROUP			
ASSEMBLY ENGINEERING DEPT. SHARP CORPORATION		図番 DRAWING No.	KSEC-100T2-0