



# MOS INTEGRATED CIRCUIT

## $\mu$ PD3574

### 2 592-BIT CCD LINEAR IMAGE SENSOR

The  $\mu$ PD3574 is a 2 592-bit linear image sensor consisting of charge coupled devices (CCDs), which convert light to voltage. This product is made up of a 2 592-bit photosensor array, charge transfer register with a pair of 1 296-bit CCDs. The photosensor has an 11  $\mu$ m pitch.

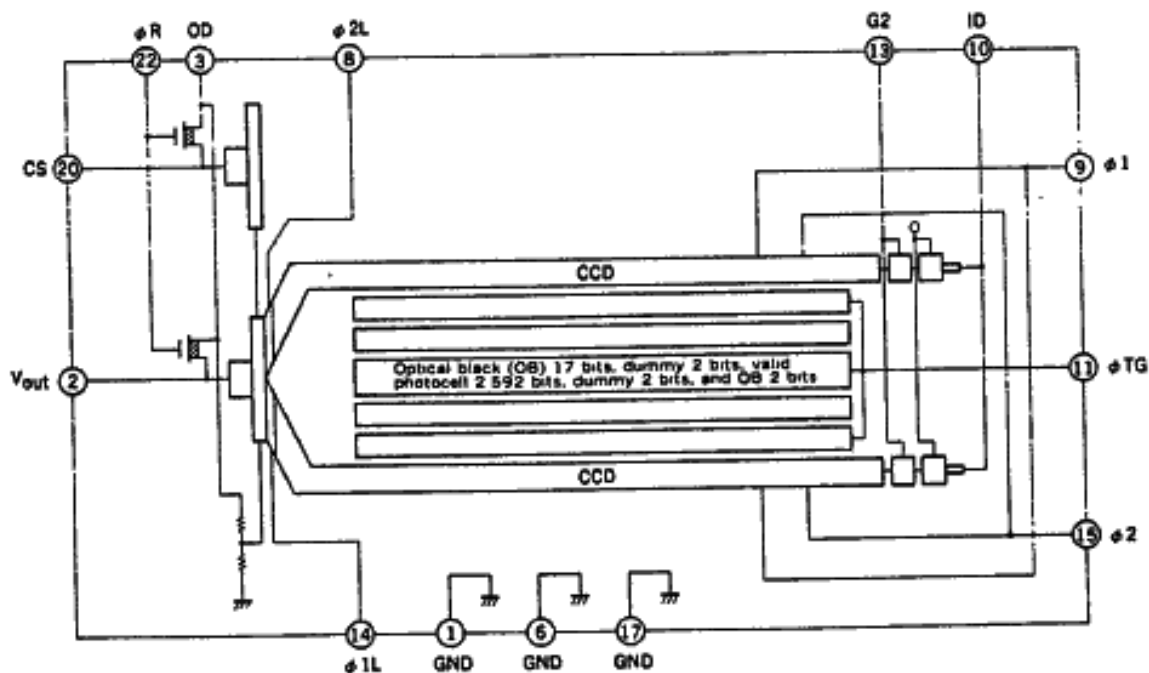
#### FEATURES

- High response sensitivity: Providing a response ten times better than the existing equivalent NEC product ( $\mu$ PD3570D) to the light from a white fluorescent lamp
- Peak response wavelength: 550 nm green
- Reads the shorter side of a B3-size sheet at a resolution of 8 dot/mm
- Driven by a 12 V single power supply

#### ORDERING INFORMATION

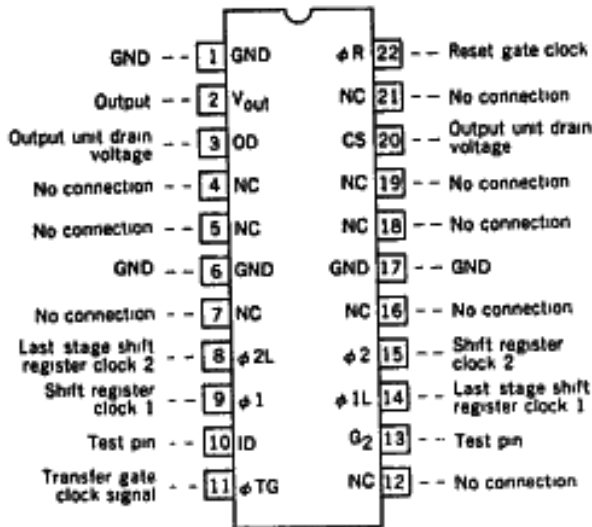
Part Number	Package
$\mu$ PD3574D	22-pin ceramic DIP (CERDIP) (400 mil)

#### BLOCK DIAGRAM

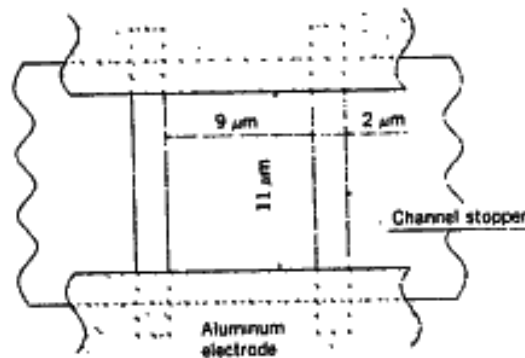


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CONNECTION DIAGRAM (Top View)



PHOTOELEMENT STRUCTURE DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> = 25 °C)

Output unit drain voltage	V <sub>OD</sub>	-0.3 to +15	V
Test pin ID voltage	V <sub>ID</sub>	-0.3 to +15	V
Shift register clock signal voltage	V <sub>φ1</sub>	-0.3 to +15	V
	V <sub>φ2</sub>	-0.3 to +15	V
Reset signal voltage	V <sub>φR</sub>	-0.3 to +15	V
Transfer gate signal voltage	V <sub>φTG</sub>	-0.3 to +15	V
Operating ambient temperature	T <sub>opt</sub>	-25 to +60	°C
Storage temperature	T <sub>stg</sub>	-40 to +100	°C

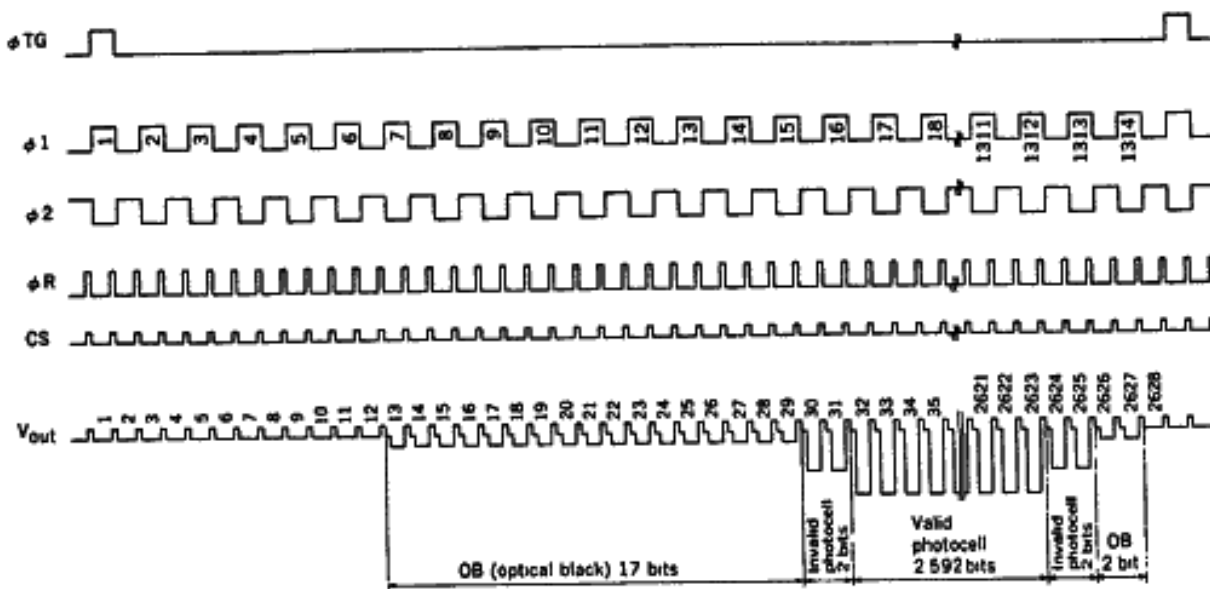
RECOMMENDED OPERATING CONDITIONS ( $T_a = -25$  to  $+60$  °C)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Output unit drain voltage	$V_{OD}$	11.4	12.0	12.6	V
Test pin $G_2$ voltage	$V_{G2}$		0		V
Test pin ID voltage	$V_{ID}$		12.0		V
Shift register clock $\phi_1$ signal high level	$V_{\phi 1H}$	4.5	5.0	12.6	V
Shift register clock $\phi_1$ signal low level	$V_{\phi 1L}$	-0.3	0	0.5	V
Shift register clock $\phi_2$ signal high level	$V_{\phi 2H}$	4.5	5.0	12.6	V
Shift register clock $\phi_2$ signal low level	$V_{\phi 2L}$	-0.3	0	0.5	V
Reset signal $\phi_{RH}$ high level	$V_{\phi RH}$	8.0	12.0	12.6	V
Reset signal $\phi_{RL}$ low level	$V_{\phi RL}$	-0.3	0	1.0	V
Transfer gate signal high level	$V_{\phi TGH}$	4.5	5.0	12.6	V
Transfer gate signal low level	$V_{\phi TGL}$	-0.3	0	0.5	V
Data rate	$f_{\phi R}$		1	3	MHz

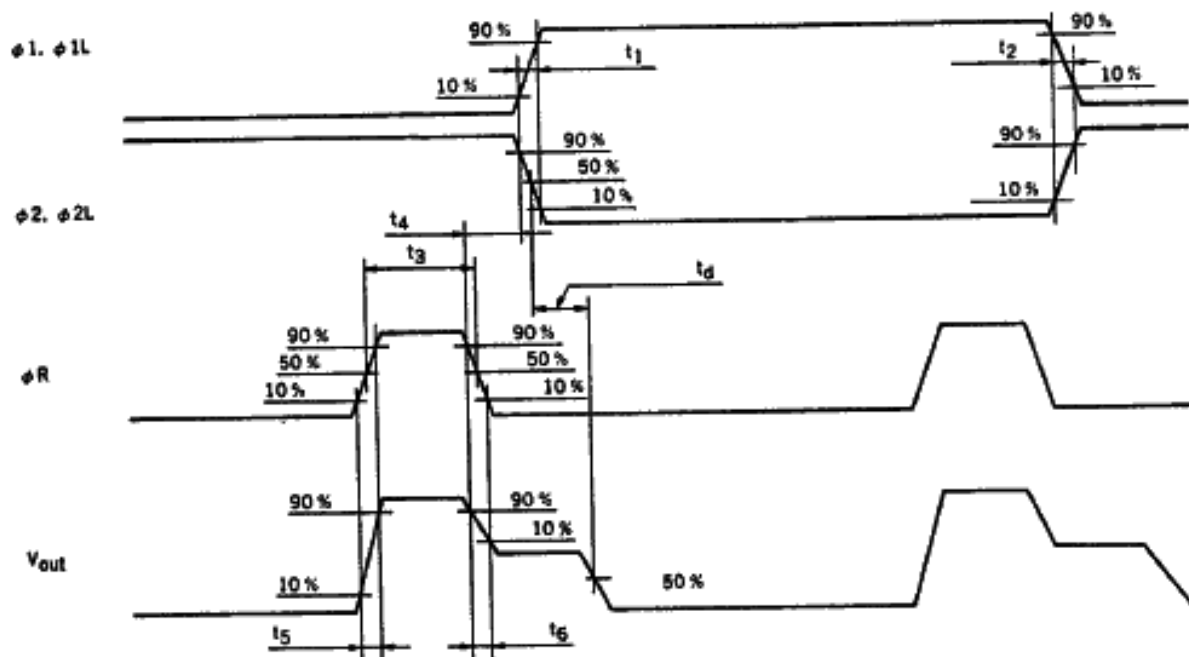
ELECTRICAL CHARACTERISTICS ( $T_a = 25$  °C,  $V_{OD} = 12.0$  V,  $f_{\phi 1} = 1$  MHz, data rate = 2 MHz, storage time = 10 ms, light source: 2 856 K tungsten bulb.)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Saturation voltage	$V_{sat}$	1.4	2.0		V	
Saturation exposure	SE	0.32	0.59		Lxs	White fluorescent lamp
Photo response non-uniformity	PRNU		$\pm 5$	$\pm 10$	%	$V_{out} = 500$ mV, White fluorescent lamp
Average dark signal	ADS		1	5	mV	Optical input interruption
Dark signal non-uniformity	DSNU		2	10	mV	Optical input interruption, peak value
Power consumption	$P_w$		100	150	mW	
Output impedance	$Z_o$	0.3	0.6	1	k $\Omega$	
Response	R	7.0	10.2	13.2	V/Lxs	W lamp
	R	2.4	3.4	4.4	V/Lxs	White fluorescent lamp
Response peak wavelength			550		nm	
Offset level	$V_{OS}$	4.5	6.5	8.5	V	
Input capacity of shift register clock pin	$C_{\phi 1}$		700	1000	pF	
	$C_{\phi 2}$					
Input capacity of last-stage clock pin	$C_{\phi 1L}$		10	20	pF	
	$C_{\phi 2L}$					
Reset pin input capacity	$C_{\phi R}$		5	15	pF	
Input capacity of transfer gate signal pin	$C_{\phi TG}$		50	150	pF	
Output rise delay time	$t_d$		20	50	ns	

TIMING CHART

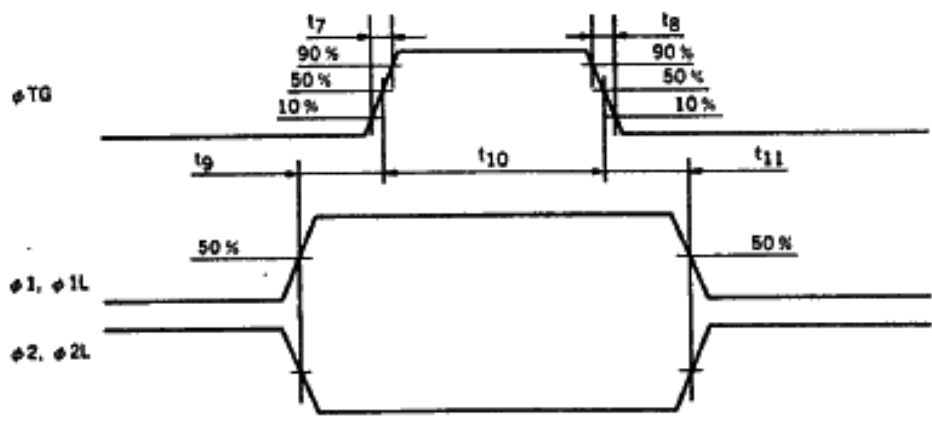


Timing chart for  $\phi_1$ ,  $\phi_{1L}$ ,  $\phi_2$ ,  $\phi_{2L}$ ,  $\phi_R$ , and  $V_{out}$

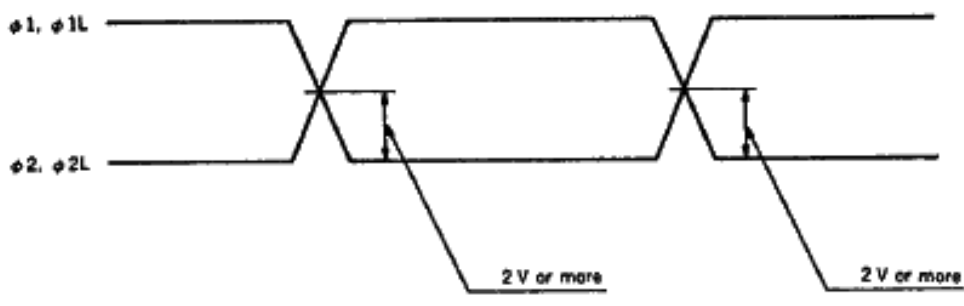


Timing chart for  $\phi TG$ ,  $\phi 1$ ,  $\phi 1L$ ,  $\phi 2$ ,  $\phi 2L$

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Cross points  $\phi 1$ ,  $\phi 1L$ ,  $\phi 2$ ,  $\phi 2L$



Name	MIN.	TYP.	MAX.
$t_1, t_2$	0	100	150
$t_3$	20	250	—
$t_4$	0	20	—
$t_5, t_6$	0	20	50
$t_7, t_8$	0	50	100
$t_9, t_{11}$	10	100	—
$t_{10}$	300	1000	—

(ns)

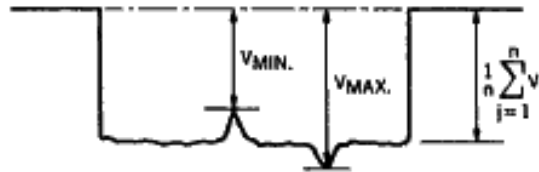
DEFINITIONS OF CHARACTERISTIC ITEMS

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1. Saturation voltage:  $V_{sat}$   
The point at which the response linearity is lost.
2. Saturation exposure: SE  
Product of intensity of illumination (lx) and storage time (s) when saturation of output voltage occurs
3. Photo response non-uniformity: PRNU  
Expressed by the following expression with the peak/bottom ratio to the average output voltage of all the valid bits.

$$PRNU(\%) = \left( \frac{V_{MAX. \text{ or } V_{MIN.}}}{\frac{1}{n} \sum_{j=1}^n V_j} - 1 \right) \times 100$$

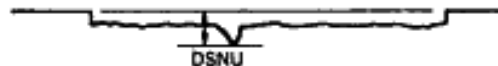
$n$  : Number of valid bits  
 $V_j$  : Output voltage of each bit



4. Average dark signal: ADS  
Output average voltage in light shielding

$$ADS(mV) = \frac{1}{n} \sum_{j=1}^n V_j$$

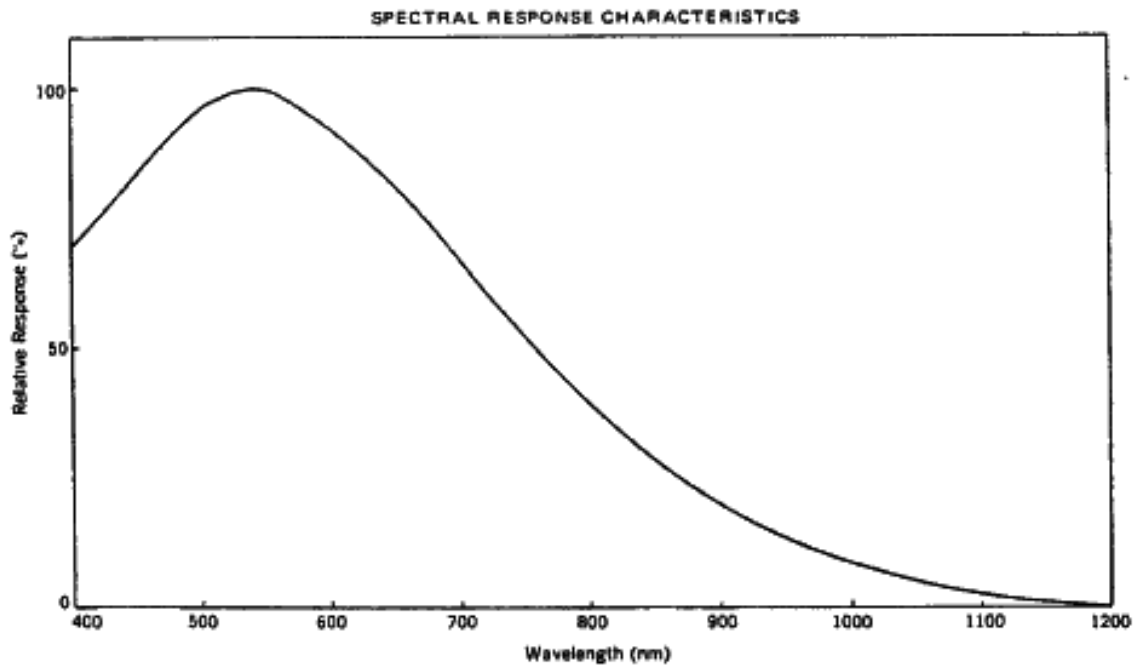
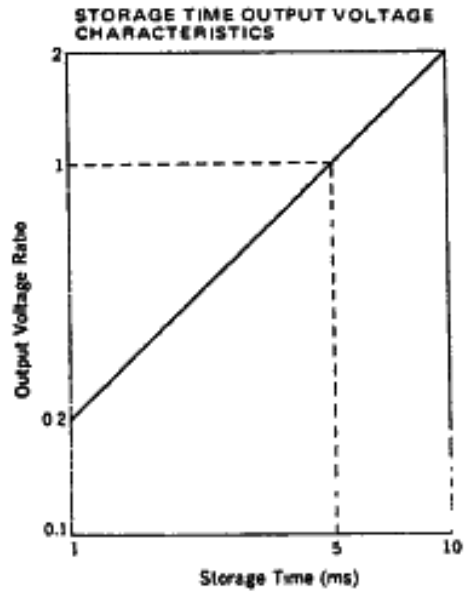
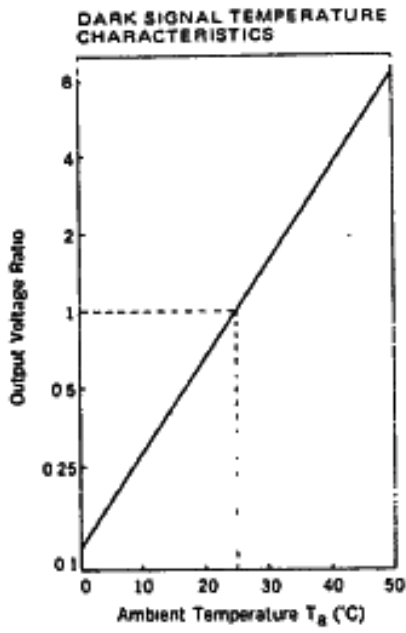
5. Dark signal non-uniformity: DSNU  
Peak output voltage to the idle level in light shielding



6. Output impedance:  $Z_o$   
Output pin impedance when viewed externally
7. Response: R  
Output voltage divided by exposure (lx·s).  
Note that the response varies with the light source.

STANDARD CHARACTERISTIC CURVES ( $T_B = 25^\circ\text{C}$ )

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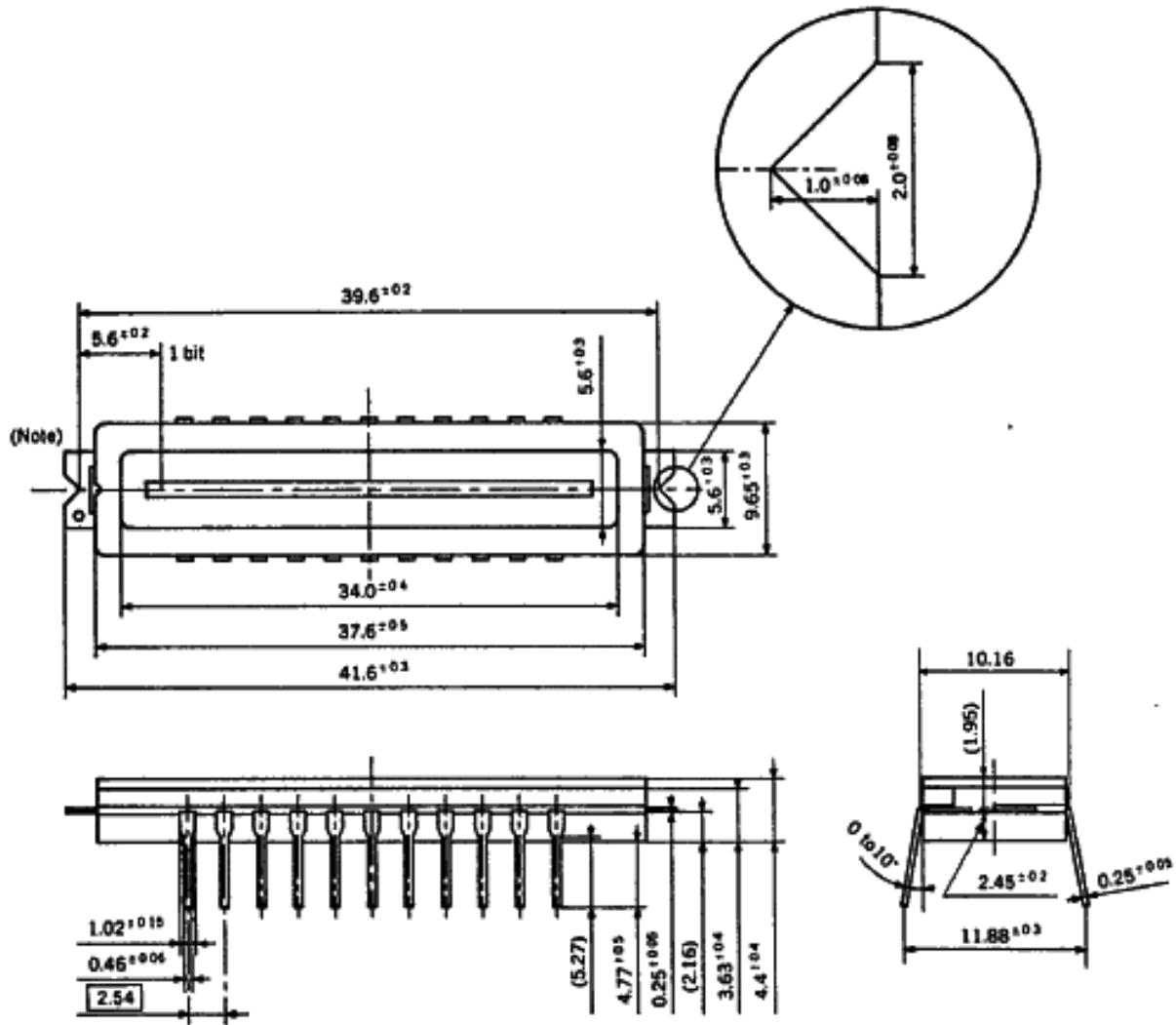






PACKAGE DIMENSIONS (Unit: mm)

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Name	Dimensions	Refractive index
Glass cap	37.6 x 9.6 x 0.7	1.5

Note: For a reference board, use this package in open status without applying electric potential.