

Preliminary

CMOS AREA IMAGE SENSOR

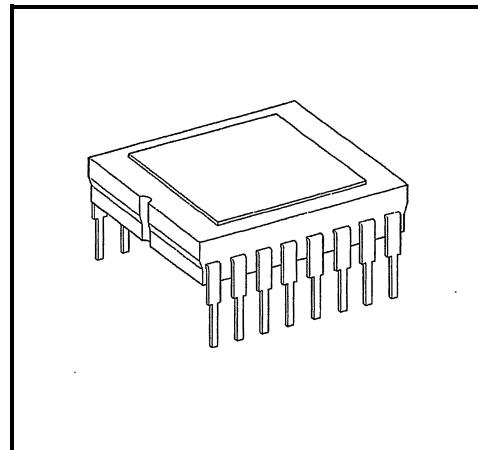
TCM5003D

1 / 4 INCH 330k PIXEL CMOS COLOR IMAGE SENSOR

The TCM5003D is a CMOS color image sensor that meets with VGA format. It enables all pixel signals to be output in sequence each 1 / 30 s. (progressive scanning)

This element is equipped with 492 vertical and 659 horizontal signal pixels, and the image size meets with 1 / 4 inch optical format.

Use of the CMOS process enables low power-consumption operations with a single power voltage driving. It also provides excellent color reproduction through its primary color filter, and it is perfect for use as an image input device for digital still cameras, PC cameras and other forms of multi-media.



Weight : 1.9 g (Typ.)

FEATURES

- Optical size : 1 / 4 inch optical format
- Total pixel numbers : 692 (H) × 504 (V)
- Signal pixel numbers : 659 (H) × 492 (V)
- Pixel pitch : 5.6 μm (H) × 5.6 μm (V) (square pixel)
- Image size : 3.6 mm (H) × 2.7 mm (V)
- Package : 16-pin DIP, cerdip
- Color filter : Primary color filter, Bayer arrangement (G check, R / B line in sequence)
- Frame frequency : 30 Hz
- Power voltage : 3.3 V
- Additional functions : Variable electronic shutter (1 / 30 to 1 / 8000 s)
Monitoring operation (each next horizontal line)

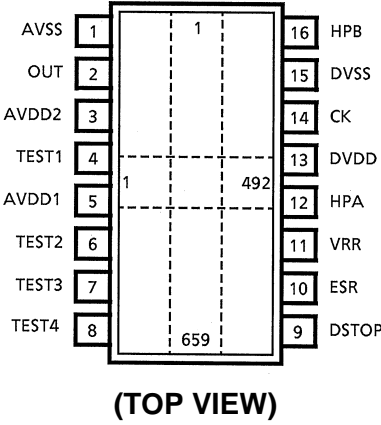
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{DD}	-0.5~4.2	V
Input Voltage	V_{IN}	-0.5~ $V_{DD} + 0.5$	V
Input Protection Diode Current	I_{IN}	±20	mA
Storage Temperature	T_{stg}	-30~85	°C

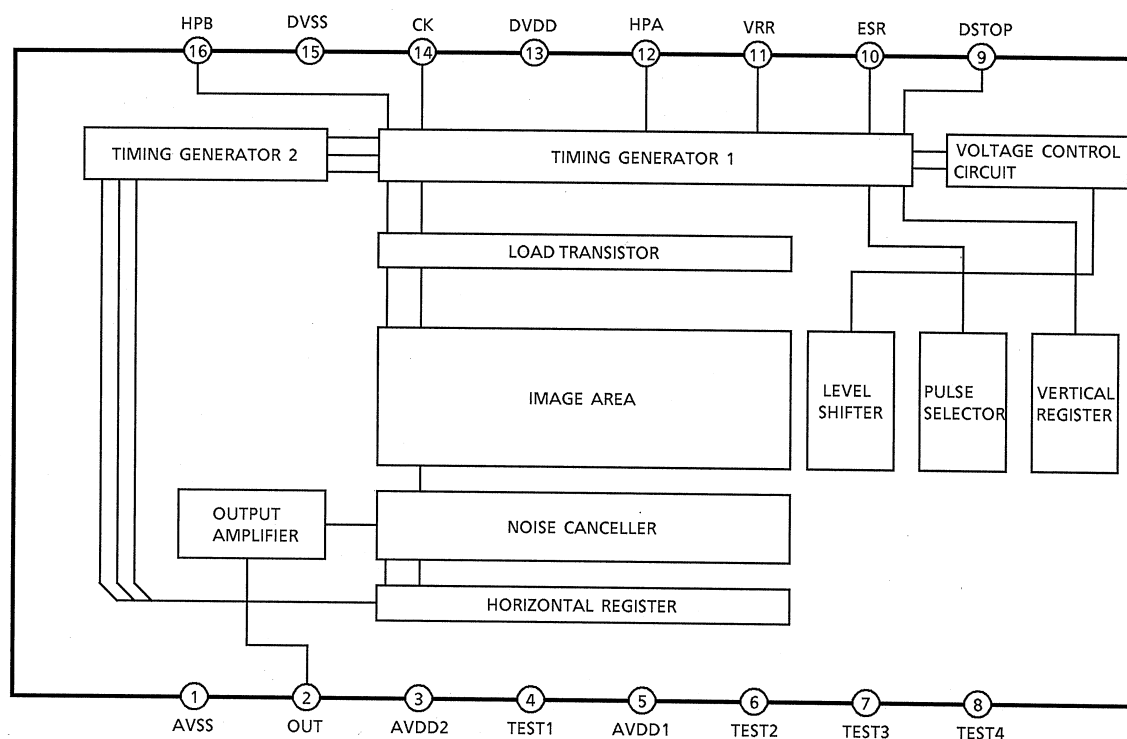
RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{AVDD} V_{DVDD}	3.0~3.6	V
Input Voltage	V_{IN}	0~ V_{DVDD}	V
Operating Temperature	T_{opr}	-20~60	°C

PIN CONNECTION



CIRCUIT DIAGRAM



PIN FUNCTIONS

PIN No.	SYMBOL	I / O	FUNCTION
1	AVSS	—	Analog GND
2	OUT	O	Signal output
3	AVDD2	—	Analog power supply 2
4	TEST1	I	Test pin. Normally connected to GND through a capacitor (4.7~10 μ F)
5	AVDD1	—	Analog power supply 1
6	TEST2	I	Test pin 2. Normally connected to GND through a capacitor (4.7~10 μ F)
7	TEST3	I	Test pin 3. Normally connected to GND through a capacitor (4.7~10 μ F)
8	TEST4	—	Test pin 4. Normally H level inputs.
9	DSTOP	I	Operations suspension control pin. H : Normal operations, L : Operations suspended
10	ESR	I	Electrical shutter start pulse input
11	VRR	I	Vertical timing start pulse input
12	HPA	I	Horizontal timing start pulse input
13	DVDD	—	Digital power supply
14	CK	I	Clock pulse input. Double the frequency of signal output.
15	DVSS	—	Digital GND
16	HPB	I	Reading mode switching pin. L : Normal operation (1 V = 525 H, 30 Hz), HPB pulse : Monitoring operation (each next horizontal line, 1 V = 262.5 H, 60 Hz)

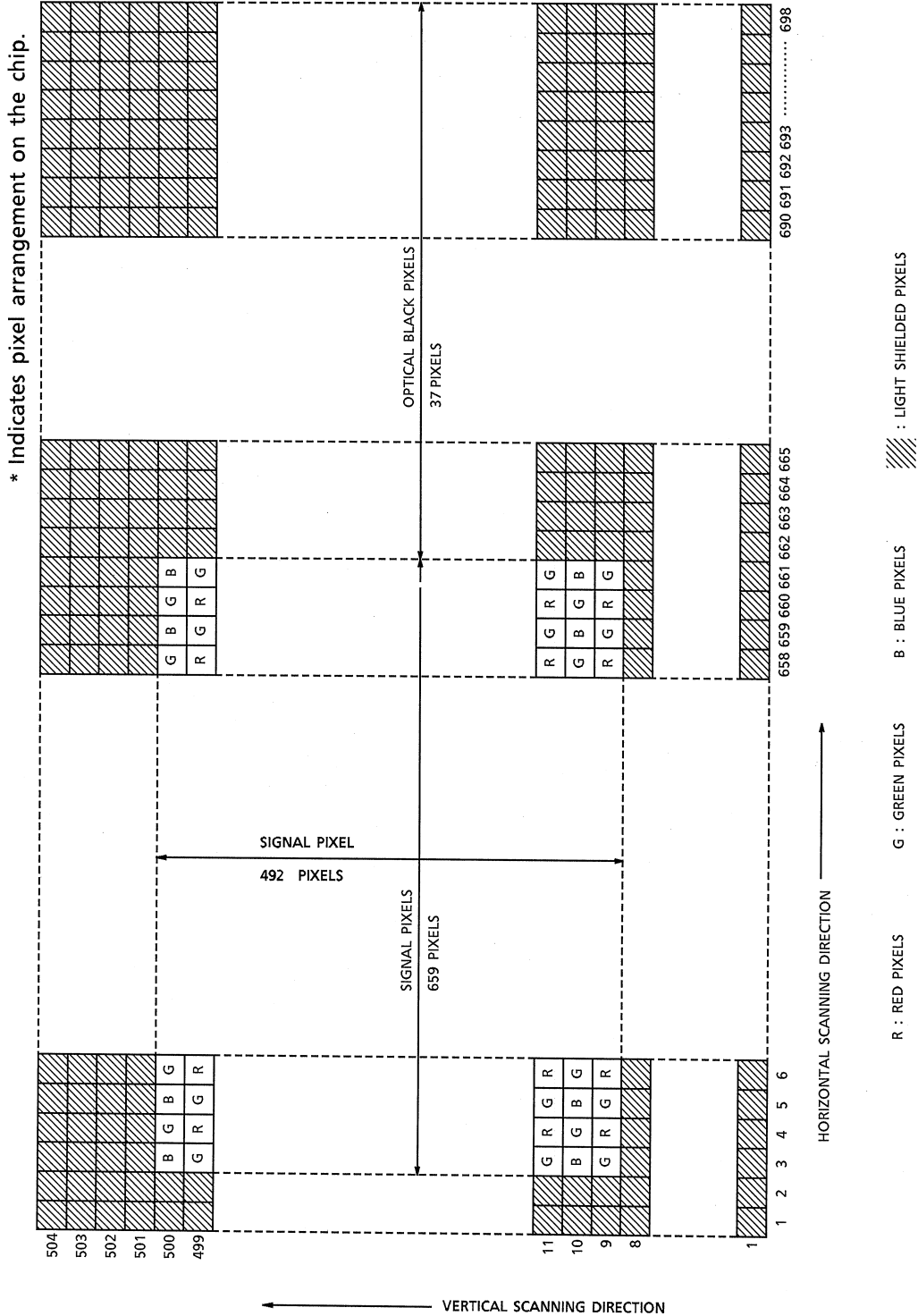
OPTICAL AND ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Sensitivity (G)	R (G)	Standard conditions (* 1) G output signal	300	400	—	mV
Saturation Voltage	V _{SAT}		500	600	—	mV
Dark Signal Voltage	V _{DRK}	Ta = 60°C, Dark condition	—	1.0	2.0	mV
Blooming Margin	BLM	Standard light condition	500	—	—	times
S / N (dark)	S / N	Dark condition	55	57	—	dB
Smearing	SMR	1 / 10 V	—	—	-140	dB
Lag	LAG	G output signal : 20 mV, 1st field	—	0	1	mV
Power Supply Current	I _{DD}	V _{DD} = 3.3 V	—	15	20	mA

* 1: Standard conditions

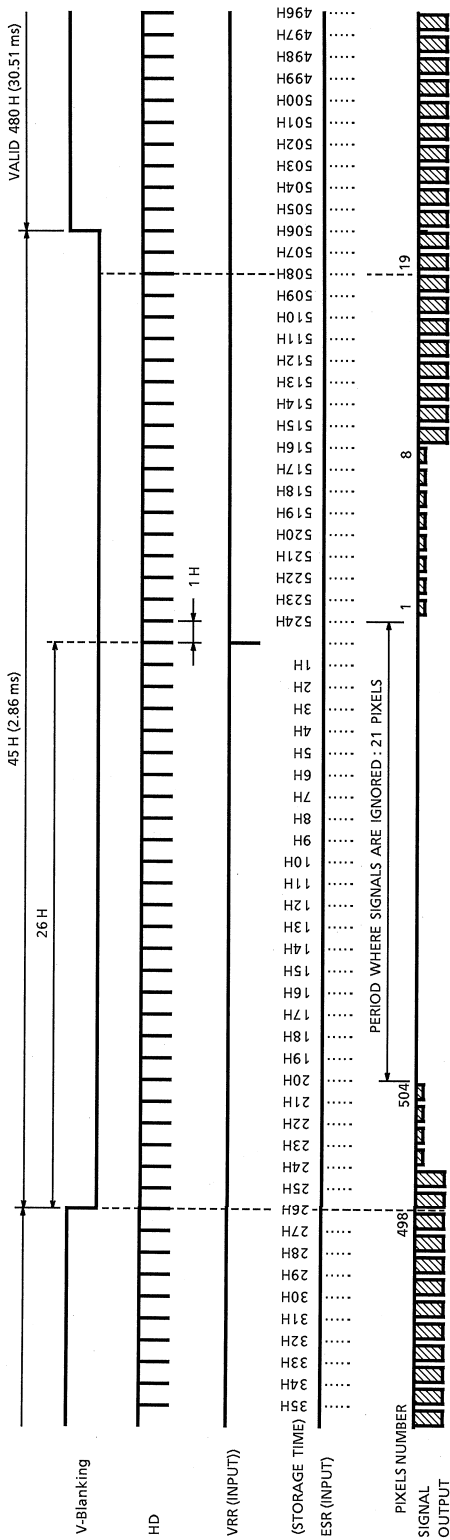
- Light conditions : Color temperature 3200 K halogen light box. Surface brightness: 100 nt of equal white light.
- IR cut filter
- Optical lens : f25 mm, F0.85 lens manufactured by Fujinon Lens Co., Ltd. Set to the F1.4.
- Frame frequency: 30 Hz continual operations, electronic shutter off (storage time = 1 / 30 s).

PIXEL ARRANGEMENT

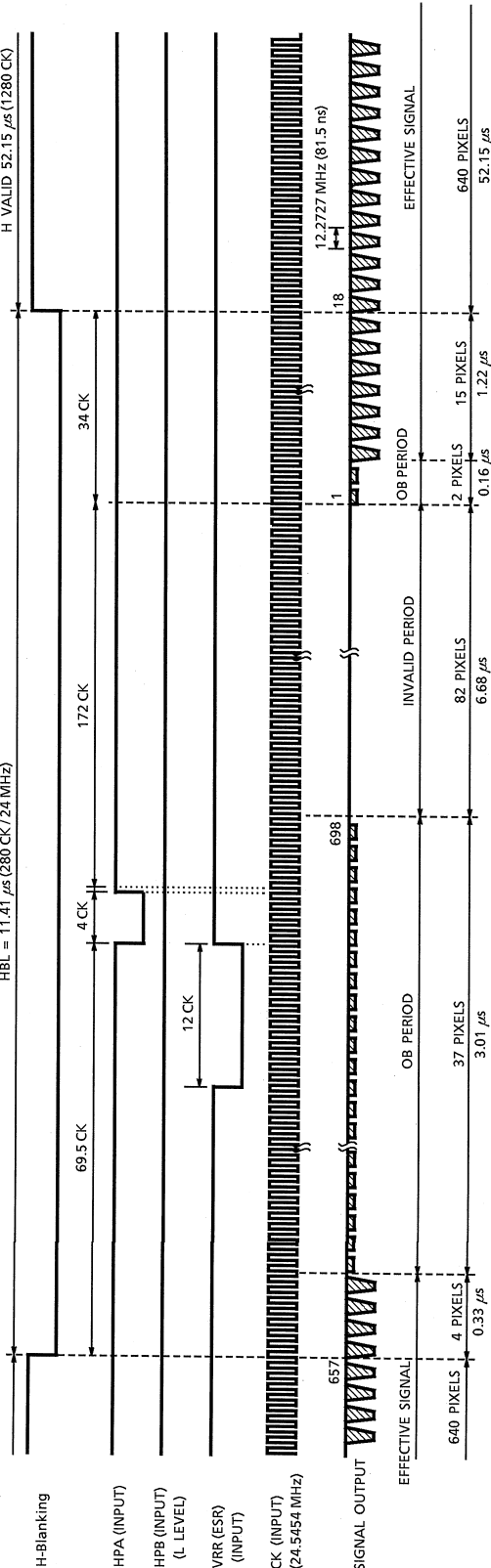


DRIVE TIMING DIAGRAM VGA progressive scanning mode (30Hz, 1V = 525H)

(1) V Blanking

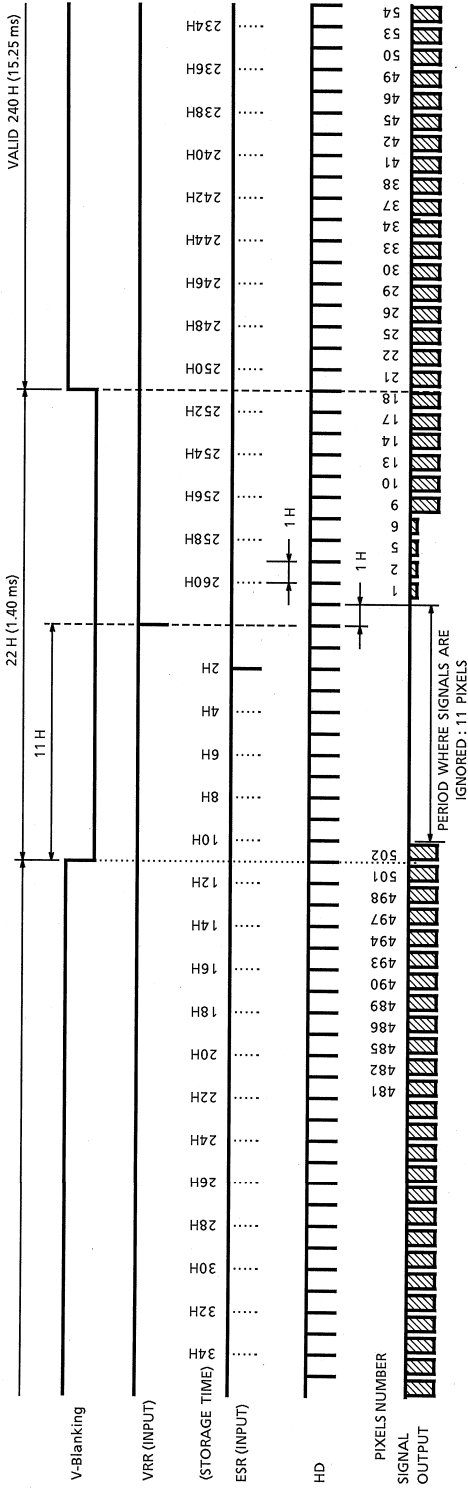


(2) H Blanking

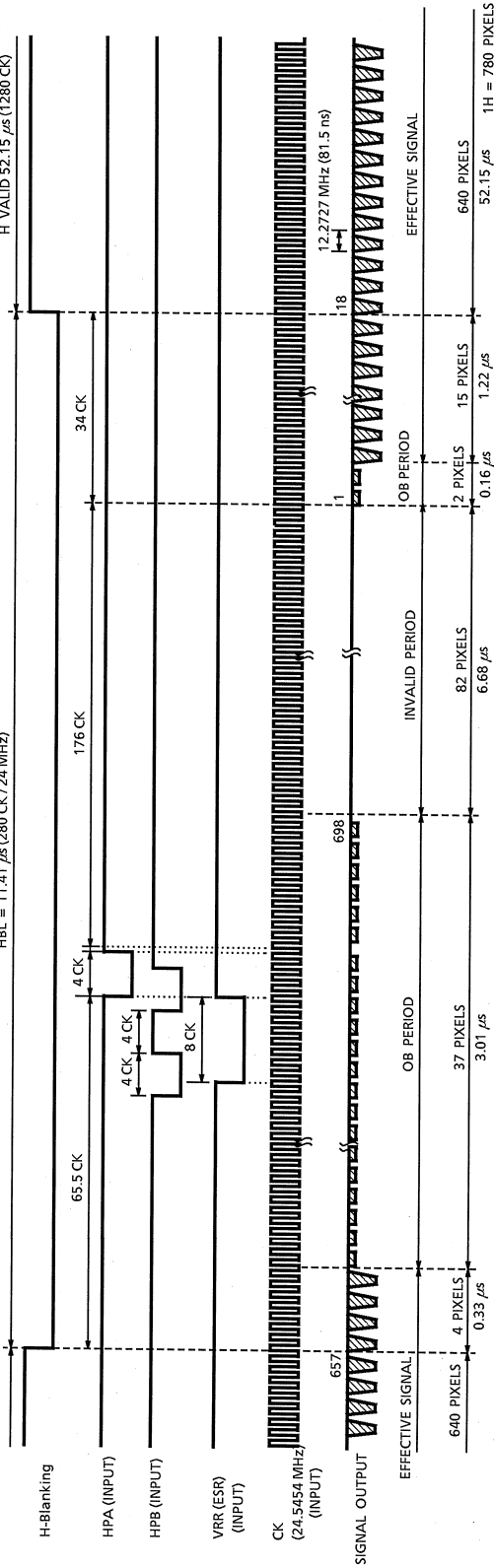


DRIVE TIMING DIAGRAM Monitoring mode

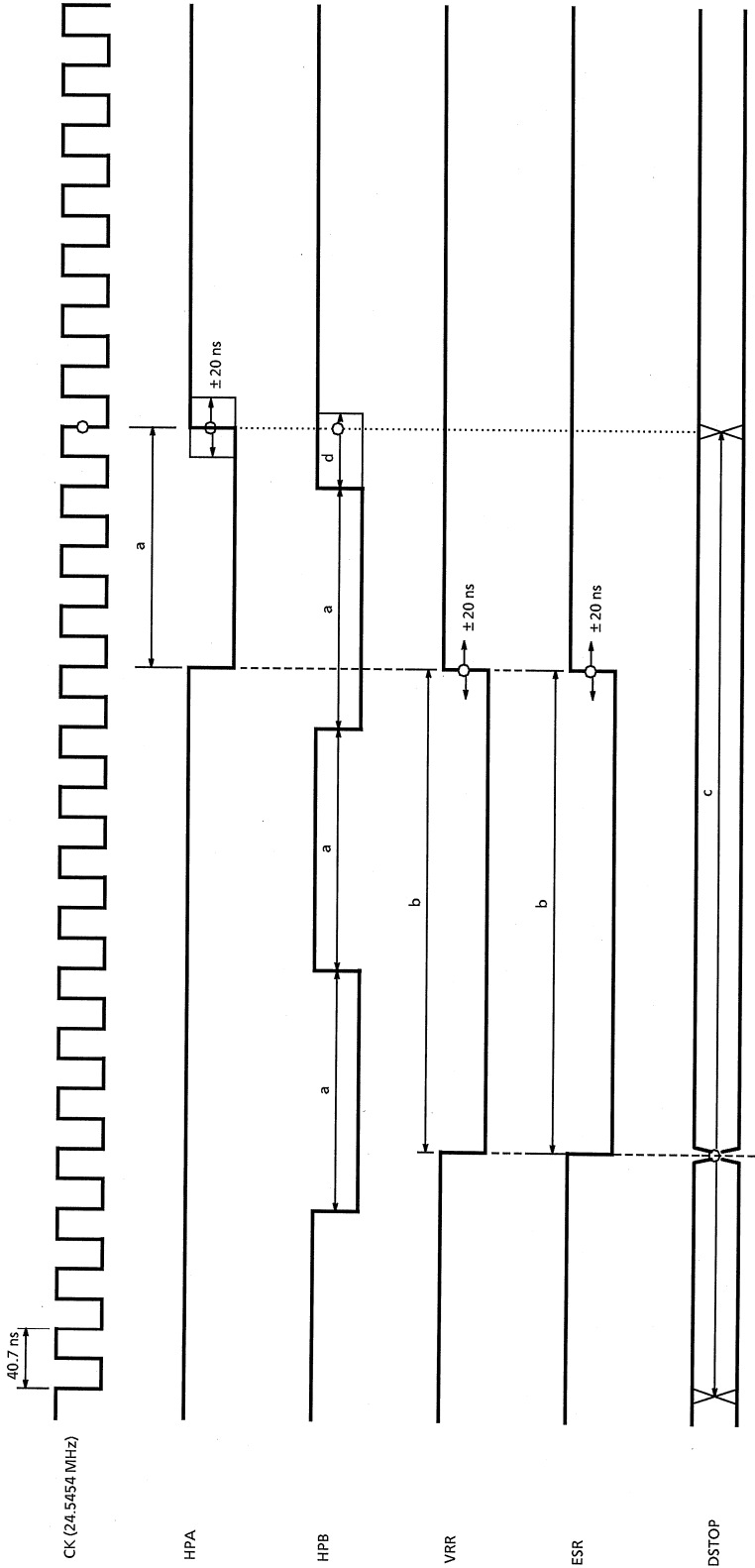
(1) V Blanking



(2) H Blanking

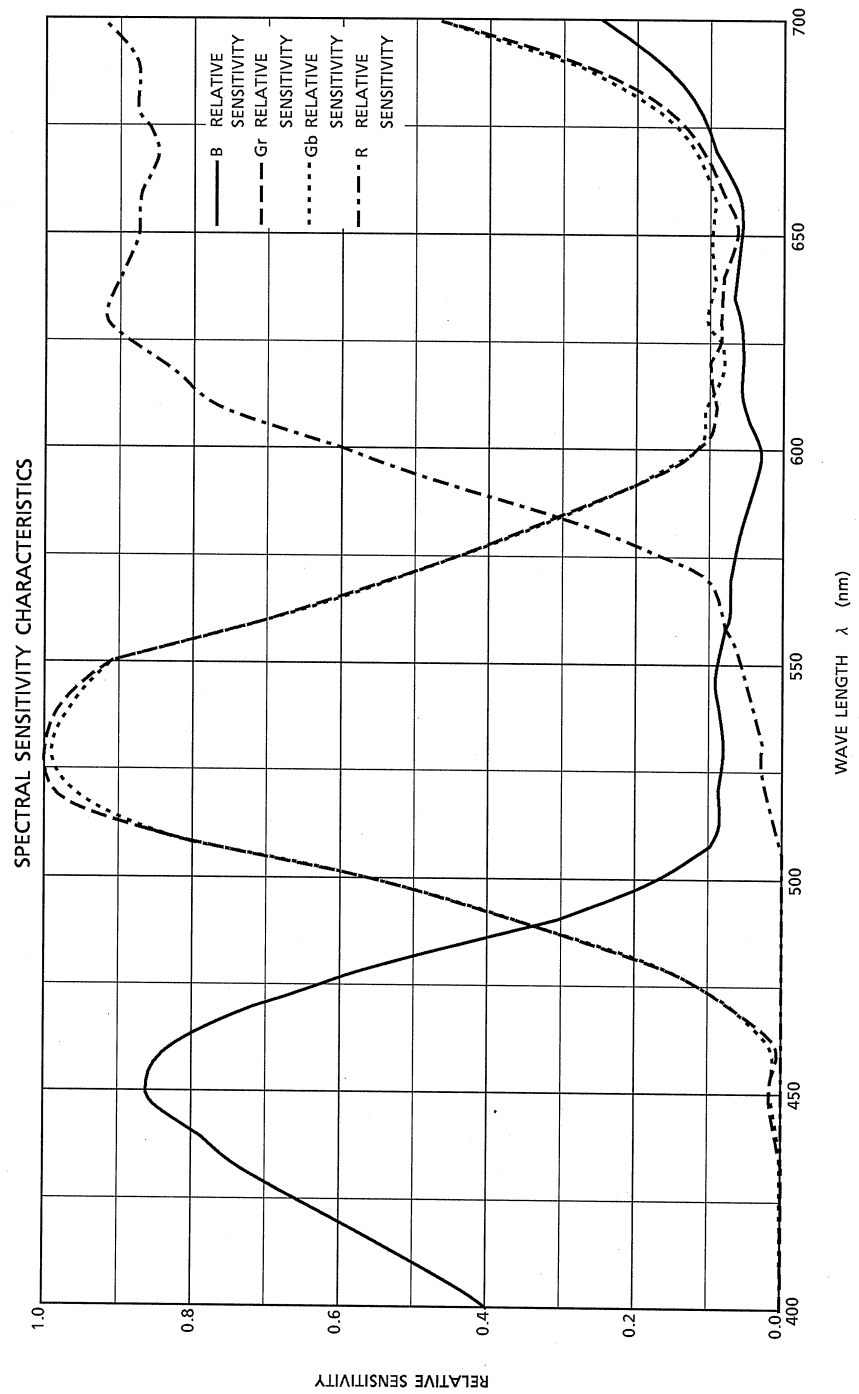


DRIVE TIMING DIAGRAM



- (Note 1) : ○ is basic point.
(Note 2) : DSTOP should be changed after VRR (ESR).
(Note 3) : When electronic shutter is not used, H level should be put into ESR terminal once after VDD and CK input.

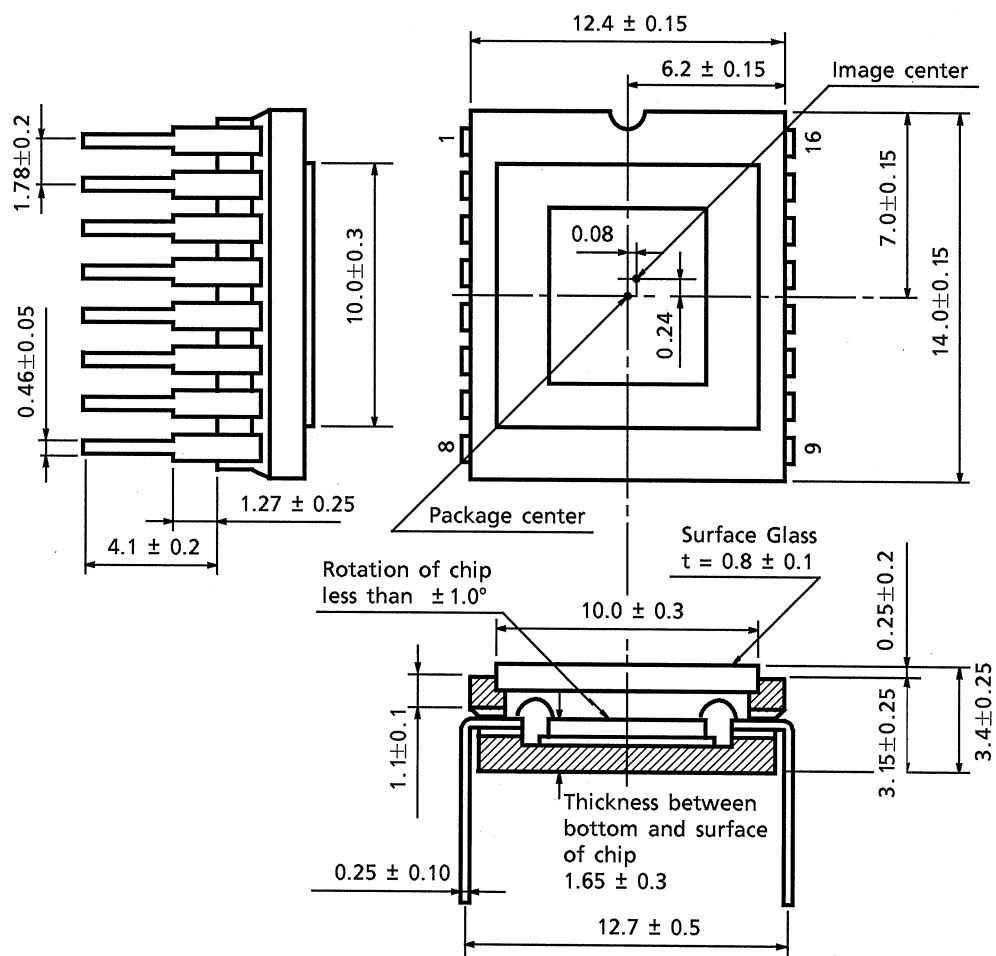
Timing Margin (ns)			
	Min.	Typ.	Max.
a	40	163	
b	81	326	
c	-160	0	a + b
d	-81	40	2



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PACKAGE DIMENSIONS

Unit : mm



Weight : 1.9 g (Typ.)

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