Preliminary

CMOS AREA IMAGE SENSOR

TCM5000D

1 / 4 INCH 330 k PIXEL CMOS B / W IMAGE SENSOR

The TCM5000D is a CMOS B / W 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. And it is perfect for use as an image input device for surveillance cameras and other industrial use.

FEATURES

• Optical size : 1/4 inch optical format • Total pixel numbers $: 692 \text{ (H)} \times 504 \text{ (V)}$

• Signal pixel numbers : $659 (H) \times 492 (V)$

• Pixel pitch : 5.6 μ m (H) × 5.6 μ m (V) (square

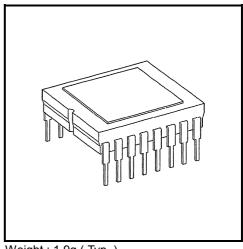
pixel)

Image size : 3.6 mm (H) × 2.7 mm (V)
 Package : 16-pin DIP, cerdip

Frame frequency : 30 HzPower voltage : 3.3 V

• Additional functions : Variable electronic shutter (1 / 30 to 1 / 8000 s)

 $Monitoring\ operation\ (each\ next\ horizontal\ line)$



Weight: 1.9g (Typ.)

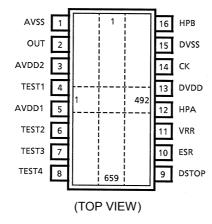
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{DD}	-0.5~4.2	٧
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

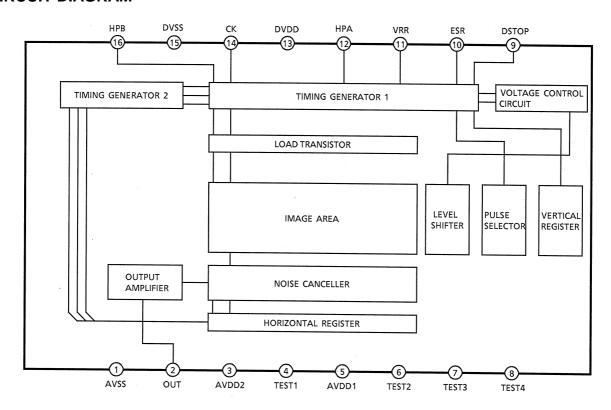
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{AVDD} V _{DVDD}	3.0~3.6	٧
Input Voltage	V _{IN}	0~V _{DVDD}	V
Operating Temperature	T _{opr}	-20~60	°C

PIN CONNECTION



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CIRCUIT DIAGRAM



PIN FUNCTIONS

PIN No.	SYMBOL	1/0	FUNCTION
1	AVSS	_	Analog GND
2	OUT	0	Signal output
3	AVDD2	_	Analog power supply 2
4	TEST1	1	Test pin. Normally connected to GND through a capacitor (4.7~10 µF)
5	AVDD1	_	Analog power supply 1
6	TEST2	I	Test pin 2. Normally connected to GND through a capacitor (4.7~10 µF)
7	TEST3	I	Test pin 3. Normally connected to GND through a capacitor (4.7~10 µF)
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	ļ	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)

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OPTICAL AND ELECTRICAL CHARACTERISTICS

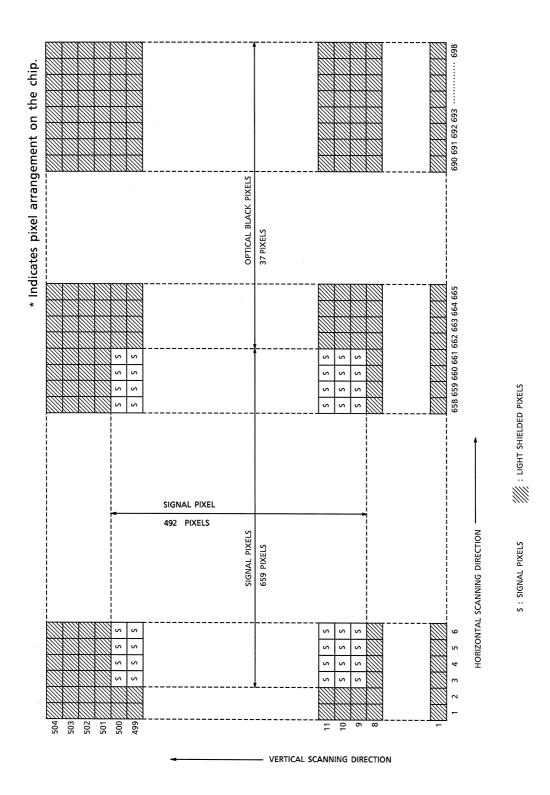
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Sensitivity	R	Standard conditions (* 1)	250	300	_	mV
Saturation Voltage	V _{SAT}		500	600	_	mV
Dark Signal Voltage	V_{DRK}	Ta = 60°C, Dark condition	_	1.0	2.0	mV
Blooming Marjin	BLM	Standard light condition	500	_	_	times
S / N (dark)	S/N	Dark condition	55	57	_	dB
Smearing	SMR	1 / 10 V	_	_	-140	dB
Lag	LAG	G output signal : 20 mV, 1 st 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.

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- IR cut filter
- Optical lens: f25 mm, F0.85 lens manufactured by Fujinon Lens Co., Ltd. Set to the F2.8.
- \bullet Frame-frequency : 30 Hz continual operations, electronic shutter off (storage time = 1 / 30 s).



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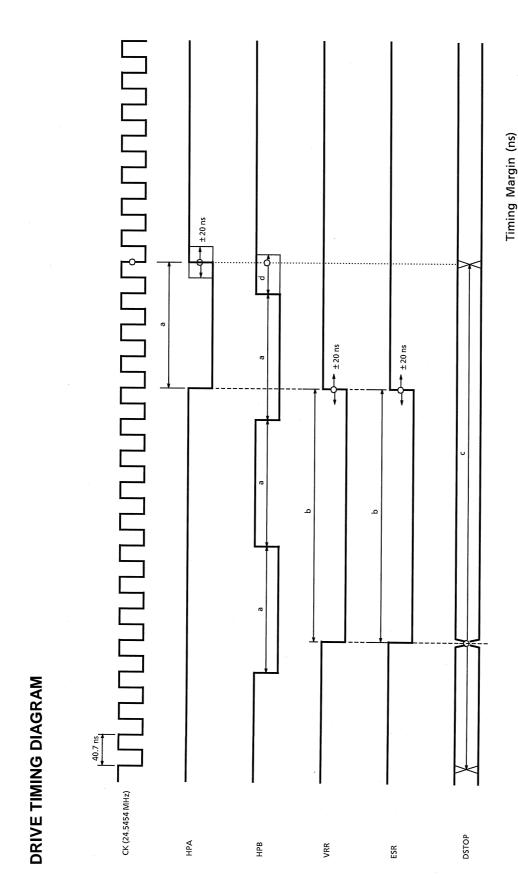
H VALID 52.15 µs (1280 CK) H96₺ VALID 480 H (30.51 ms) HZ6t EFFECTIVE SIGNAL 12.2727 MHz (81.5 ns) H867 $52.15 \, \mu s$ H667 H009 HLOS 205H 203H 204H 202H H909 HZOS -H80S H609 15 PIXELS 1.22 µs ногс ниц 34 CK 215H 213Н OB PERIOD 12 PIXELS 0.16 µs 21 tH 1212H 21 PH HZIS 218H DRIVE TIMING DIAGRAM VGA progressive scanning mode (30Hz, 1V = 525H) н6 і ѕ 250H 251H NVALID PERIOD 255H 253H 82 PIXELS 6.68 µs 254H 172 CK нι 45 H (2.86 ms) 7H PERIOD WHERE SIGNALS ARE IGNORED: 21 PIXELS нε НÞ HBL = 11.41 μ s (280 CK / 24 MHz) Нς Н9 869 ववववववववववववव(व्रवववव ΗZ Н8 Н6 нοι 4 CK ни ۱۲н 26 H нει Ηbι 12 CK OB PERIOD игн 37 PIXELS 3.01 µs н9≀ нΖι Н8 Г Н6 Ι H02 504 2 69.5 CK ніг H22 73H 74H SZH Н97 Н۷ζ 4 PIXELS H82 H67 SIGNAL OUTPUT нοε нιε 640 PIXELS 35H **.** EFFECTIVE SIGNAL 33H **.** (1) V Blanking H Blanking TCM5000D - 6 TORAGE TIME) జ PIXELS NUMBER CK (INPUT) (24.5454 MHz) VRR (INPUT)) HPB (INPUT) (L LEVEL) ESR (INPUT) HPA (INPUT) V-Blanking H-Blanking VRR (ESR) (INPUT) SIGNAL OUTPUT 딮 (2)

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1 H = 1560 CK 1 H = 780 PIXELS 12.2727 WHz (81.5 ns) H VALID 52.15 µs (1280 CK) VALID 240 H (15.25 ms) 734H EFFECTIVE SIGNAL H987 640 PIXELS 738H 740H 742H 744H 30 92 92 22 22 73 746H 15 PIXELS 1.22 µs 748H 34 CK 720H OB PERIOD 2 PIXELS 0.16 µs 725H 11 13 01 6 9 724H **72**9H 728H 2 1 INVALID PERIOD 82 PIXELS H097 22 H (1.40 ms) 6.68 µs PERIOD WHERE SIGNALS ARE IGNORED: 11 PIXELS 176 CK Н7 HBL = 11.41 μ s (280 CK / 24 MHz) Нħ 1 1 Н9 Н8 нοι 205 109 ۱۲н 867 1 4 CK **46** нъι DRIVE TIMING DIAGRAM Monitoring mode 76t CK (24.5454 MHz) MINITURINI MINITURI MI OB PERIOD 37 PIXELS 3.01 µs £67 4 CK 4 CK н9 і . ⊗ ∀ 067 684 18H 987 482 T07 485 12Z 65.5 CK T7H H9Z H82 4 PIXELS SIGNAL OUTPUT BURNEL 0.33 µs 30H 35H EFFECTIVE SIGNAL 640 PIXELS (STORAGE TIME) PIXELS NUMBER (1) V Blanking H. Blanking TCM5000D - 7 VRR (INPUT) HPA (INPUT) ESR (INPUT) V-Blanking HPB (INPUT) H-Blanking SIGNAL OUTPUT VRR (ESR) (INPUT) 皇 $\overline{2}$

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	Min.	Typ.	Мах.
а	40	163	
q	81	326	
J	- 160	0	a + b
ס	-81	40	2

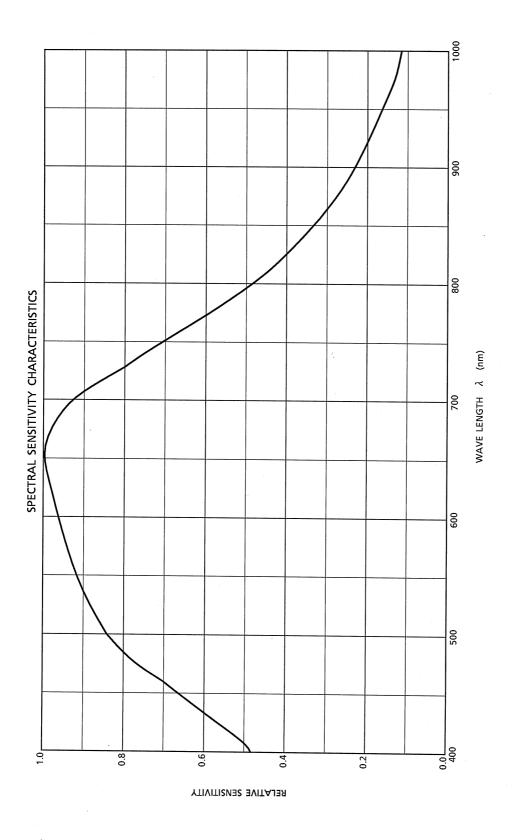
	3	9	a -	0	
ı yp.	163	326		40	
IVIIII.	40	81	- 160	-81	
	в	q	J	þ	

(Note 1) : O is basic point.

When electronic shutter is not used, H level should be put into (Note 2) : DSTOP should be changed after VRR (ESR). (Note 3) : When electronic shutter is not used, H level

ESR terminal once after V_{DD} and CK input.

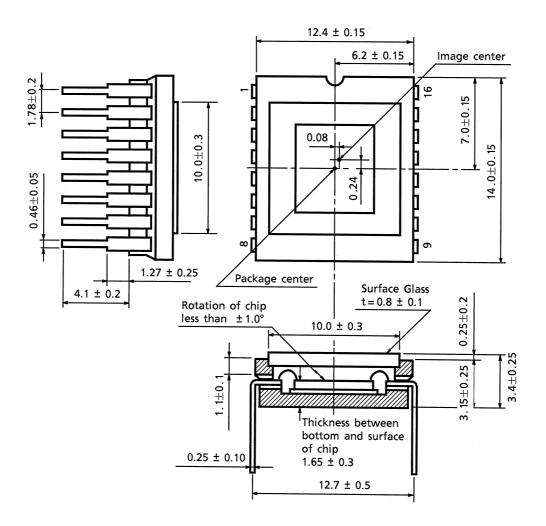
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PACKAGE DIMENSIONS

Unit: mm



Weight: 1.9 g (Typ.)

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