TENTATIVE

CMOS AREA IMAGE SENSOR

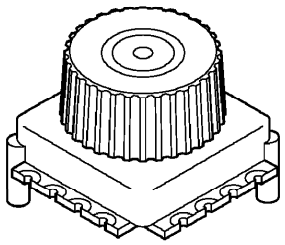
TCM5020LU

1/7 INCH 110k PIXEL CMOS B/W IMAGE SENSOR

The TCM5020LU is a CMOS b/w (=black and white) image sensor that meets with CIF format. It enables all pixel signals to be output in sequence each 1/30 s. (progressive scanning)

This element is equipped with 290 vertical and 367 horizontal signal pixels, and the image size meets with 1/7 inch optical format. The package with lens is applicable. This small lens unit package realize small-scaled system.

Use of the CMOS process enables low power-consumption operations with a single power voltage driving. It is perfect for use as an image input device for mobile equipments.



WQFN16-C-S420-1.60

Weight : 0.5 g (Typ.)

FEATURES

- Optical size : 1/7 inch optical format
- Total pixel numbers : 382 (H) × 306 (V)
- Signal pixel numbers : 367 (H) × 290 (V)
- Pixel pitch : 5.6 μm (H) × 5.6 μm (V) (square pixel)
- Image size : 2.055 mm (H) × 1.624 mm (V)
- Package : 16-pin Optical lens unit
- Frame frequency : 30 Hz
- Power voltage : 2.8 V
- Additional functions : Variable electronic shutter (1/30 to 1/4500 s)

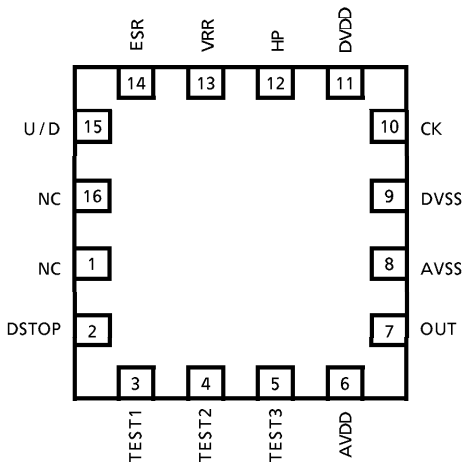
MAXIMUM RATINGS

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}	−30~60	°C

RECOMMENDED OPERATING CONDITIONS

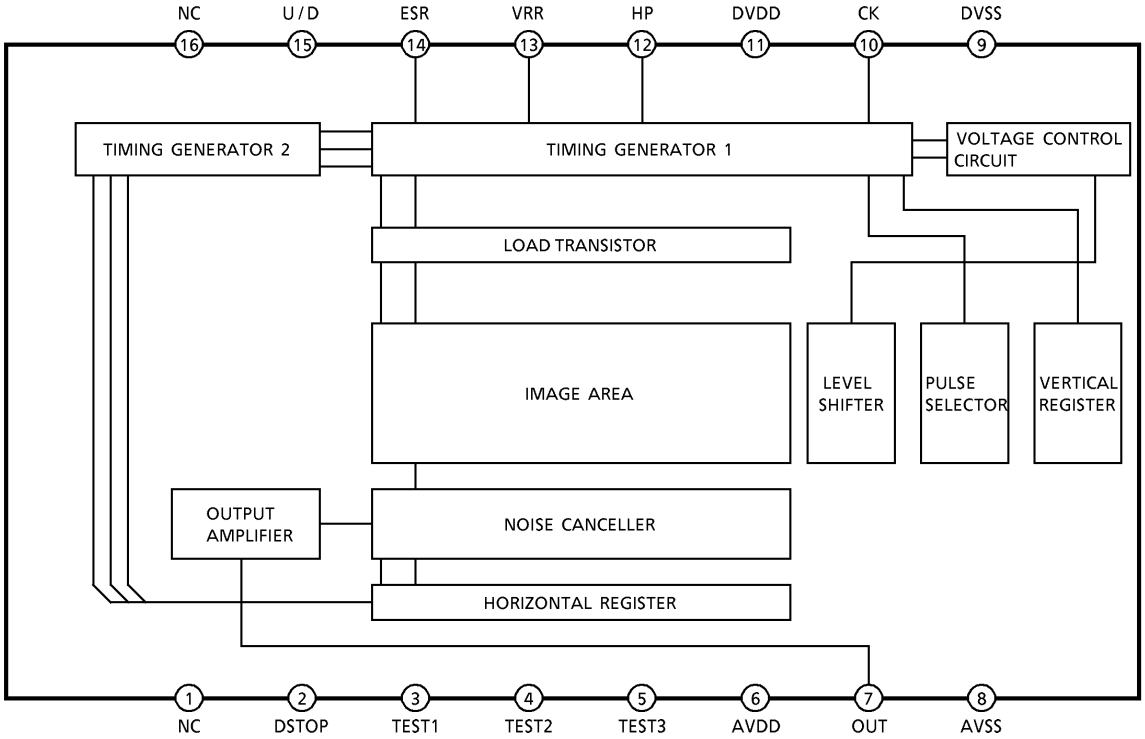
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{AVDD} V_{DVDD}	2.6~3.0	V
Input Voltage	V_{IN}	0~V_{DD}	V
Operating Temperature	T_{opr}	−20~50	°C

PIN CONNECTION



(TOP VIEW)

CIRCUIT DIAGRAM



PIN FUNCTIONS

PIN No.	SYMBOL	I/O	FUNCTION
1	NC	—	No connection
2	DSTOP	I	Operations suspension control pin. H : Normal operations, L : Operations suspended
3	TEST1	I	Test pin. Normally connected to GND through a capacitor (4.7~10 μF)
4	TEST2	I	Test pin 2. Normally connected to GND through a capacitor (0.1~10 μF)
5	TEST3	I	Test pin 3. Normally connected to GND through a capacitor (0.1~10 μF)
6	AVDD	—	Analog power supply
7	OUT	O	Signal output
8	AVSS	—	Analog GND
9	DVSS	—	Digital GND
10	CK	I	Clock pulse input. Double the frequency of signal output.
11	DVDD	—	Digital power supply
12	HP	I	Horizontal timing start pulse input
13	VRR	I	Vertical timing start pulse input
14	ESR	I	Electrical shutter start pulse input
15	U/D	I	Reading mode switching pin. L : Normal operation H : Up and down inverting mode
16	NC	—	No connection

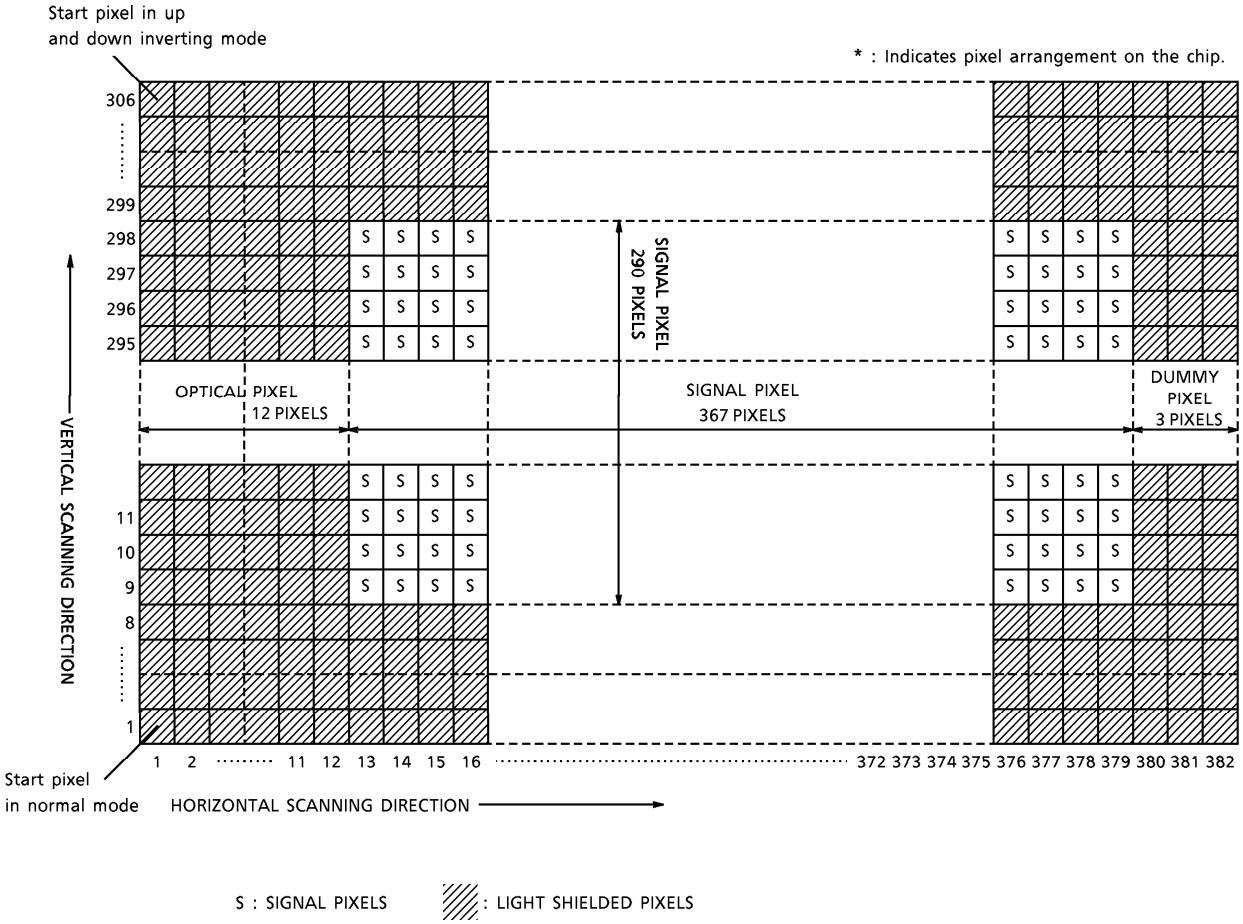
OPTICAL AND ELECTRICAL CHARACTERISTICS

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	Output signal : 20 mV, 1st field	—	0	1	mV
Power Supply Current	I_{DD}	V_{DD} = 2.8 V	—	5	10	mA

(*1) : Standard conditions

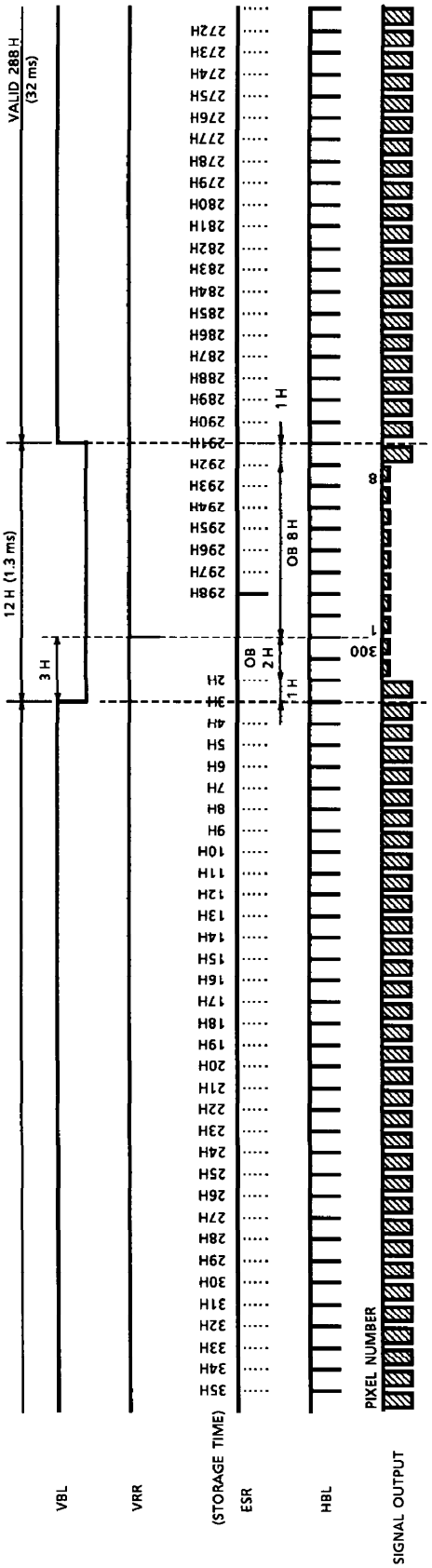
- Light conditions : Color temperature 3200 K halogen light box. Surface brightness: 100 nt of equal white light.
- IR cut filter
- Optical lens : Focal length f = 2.173 mm
  F number F2.8
  Field of view H52° / V39°
  MTF 80 lines in central
  32 lines around
  TV distortion – 2.8%
- Frame frequency : 30 Hz continual operations, electronic shutter off (storage time = 1 / 30 s).

PIXEL ARRANGEMENT



DRIVE TIMING DIAGRAM Progressive scanning mode (30 Hz, 1 V = 300 H)

(1) V Blanking



(2) H Blanking

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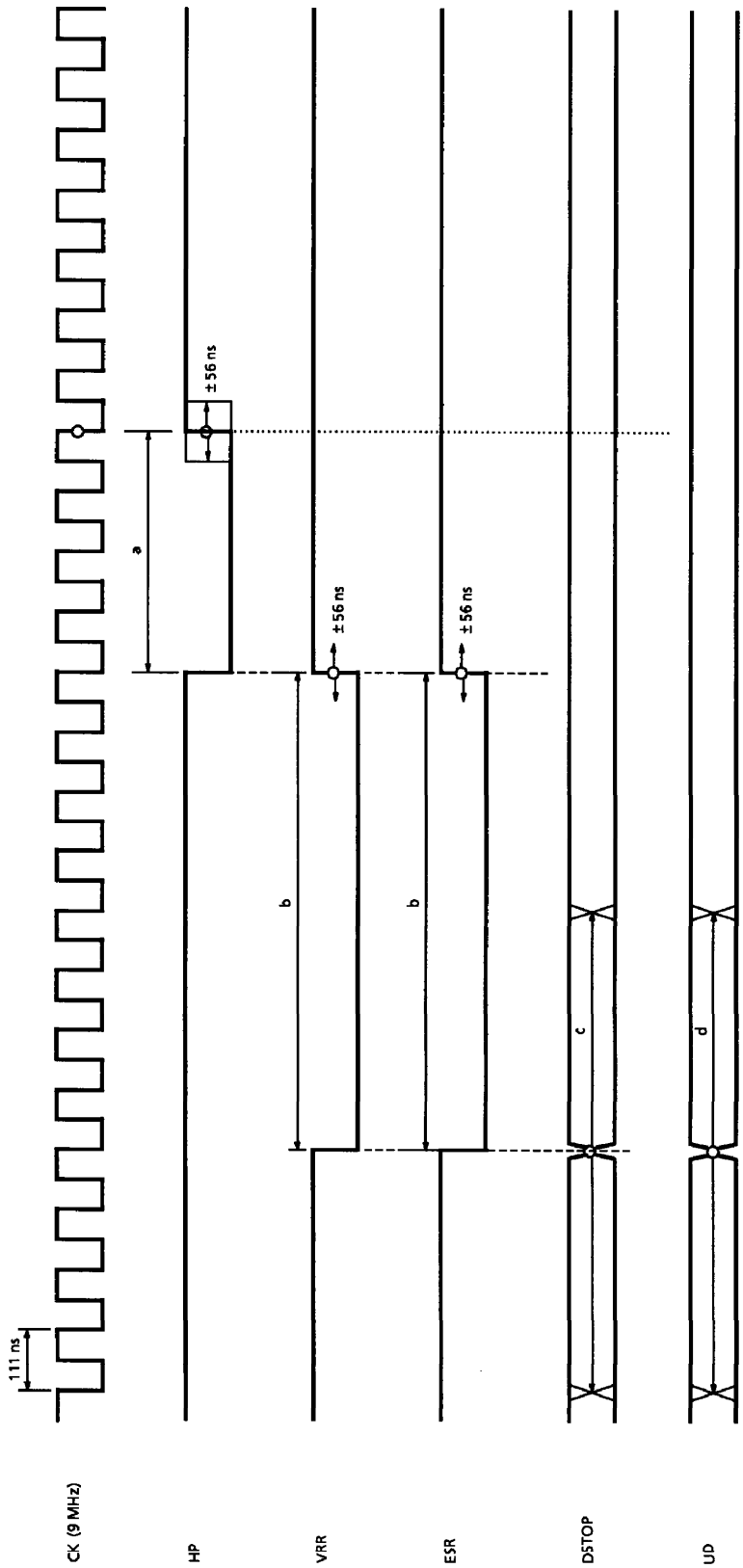
DRIVE TIMING DIAGRAM



Timing Margin (ns)

	Min.	Typ.	Max.
a	111	444	
b	222	888	
c	−444	0	444
d	−444	0	444

(Note 1) : ○ is basic point.
(Note 2) : DSTOP should be changed after VRR (ESR).

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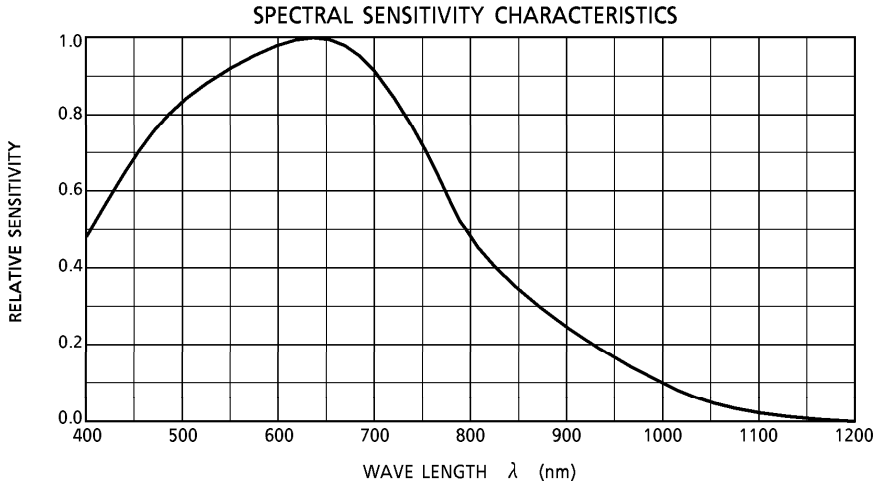
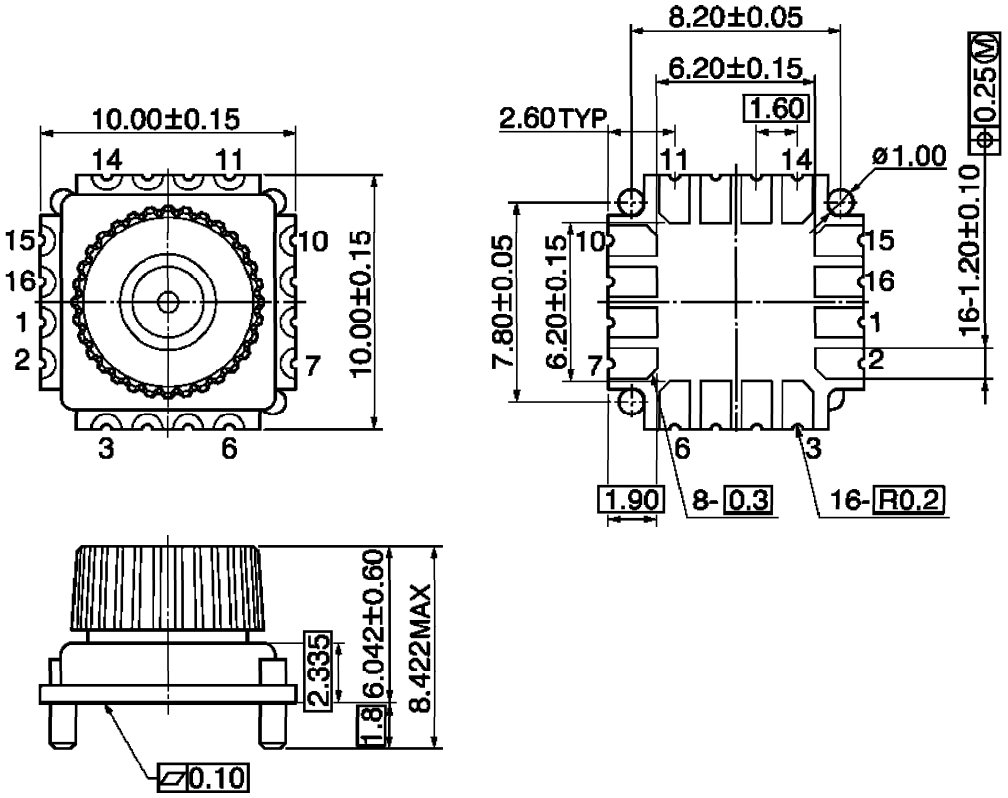

SPECTRAL SENSITIVITY CHARACTERISTICS
RELATIVE SENSITIVITY
1.0
0.8
0.6
0.4
0.2
0.0
400
500
600
700
800
900
1000
1100
1200
WAVE LENGTH λ (nm)

PACKAGE DIMENSIONS

WQFN16-C-S420-1.60 Unit : mm



Weight : 0.5 g (Typ.)

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