

TENTATIVE

CMOS AREA IMAGE SENSOR

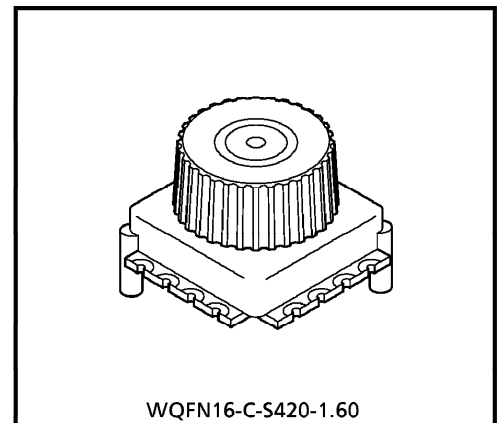
TCM5023LU

1/7 INCH 110k PIXEL CMOS COLOR IMAGE SENSOR

The TCM5023LU is a CMOS color 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 also provides excellent color reproduction through its primary color filter, and it is perfect for use as an image input device for mobile equipments, PC cameras and other forms of multi-media.



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
- Color filter : Primary color filter, Bayer arrangement (G check, R/B line in sequence)
- Frame frequency : 30 Hz
- Power voltage : 2.8 V
- Additional functions : Variable electronic shutter (1/30 to 1/4500 s)

980910EBA1

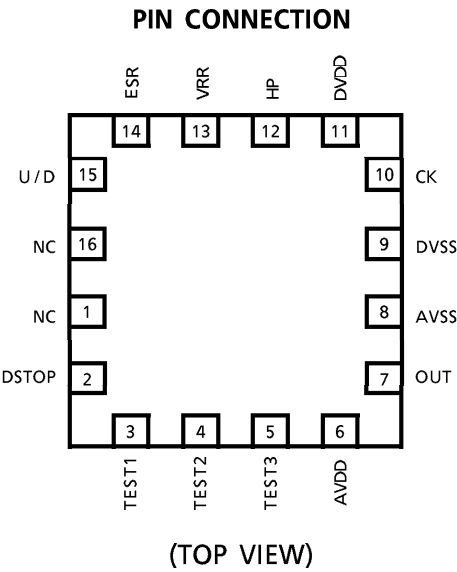
- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

MAXIMUM RATINGS

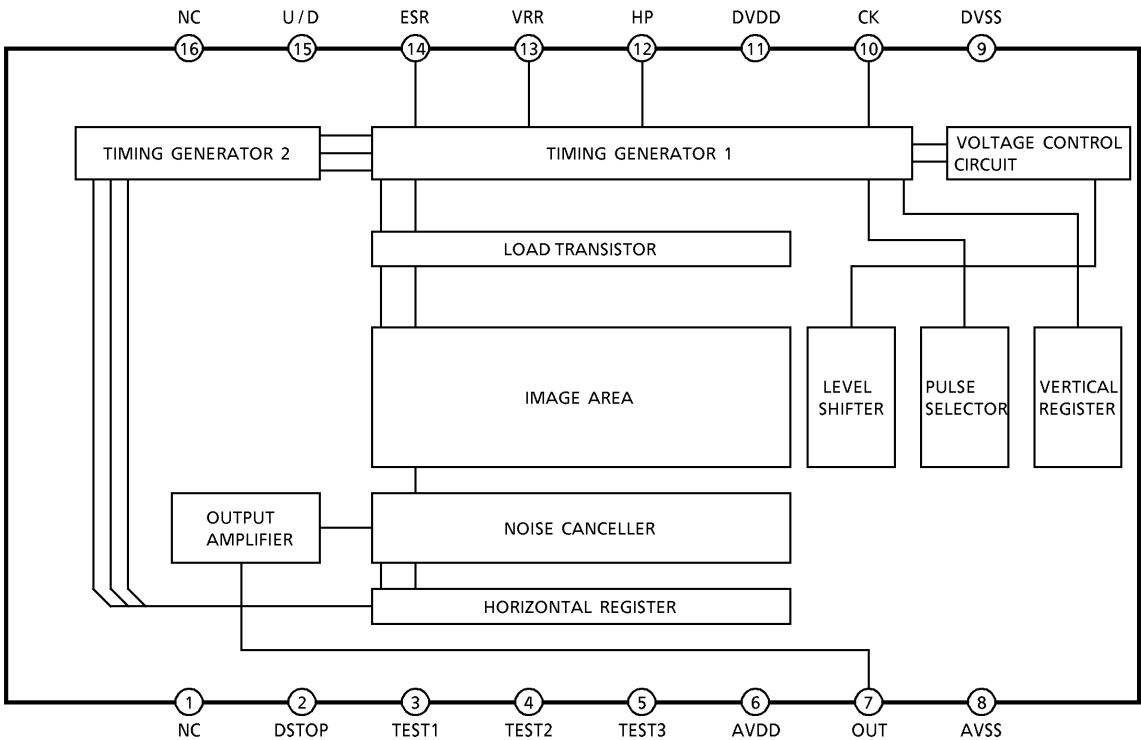
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{DD}	$-0.5 \sim 4.2$	V
Input Voltage	V_{IN}	$-0.5 \sim V_{DD} + 0.5$	V
Input Protection Diode Current	I_{IN}	± 20	mA
Storage Temperature	T_{stg}	$-30 \sim 60$	$^{\circ}\text{C}$

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{AVDD} V_{DVDD}	$2.6 \sim 3.0$	V
Input Voltage	V_{IN}	$0 \sim V_{DD}$	V
Operating Temperature	T_{opr}	$-20 \sim 50$	$^{\circ}\text{C}$



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 μ F)
4	TEST2	I	Test pin 2. Normally connected to GND through a capacitor (0.1~10 μ F)
5	TEST3	I	Test pin 3. Normally connected to GND through a capacitor (0.1~10 μ F)
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

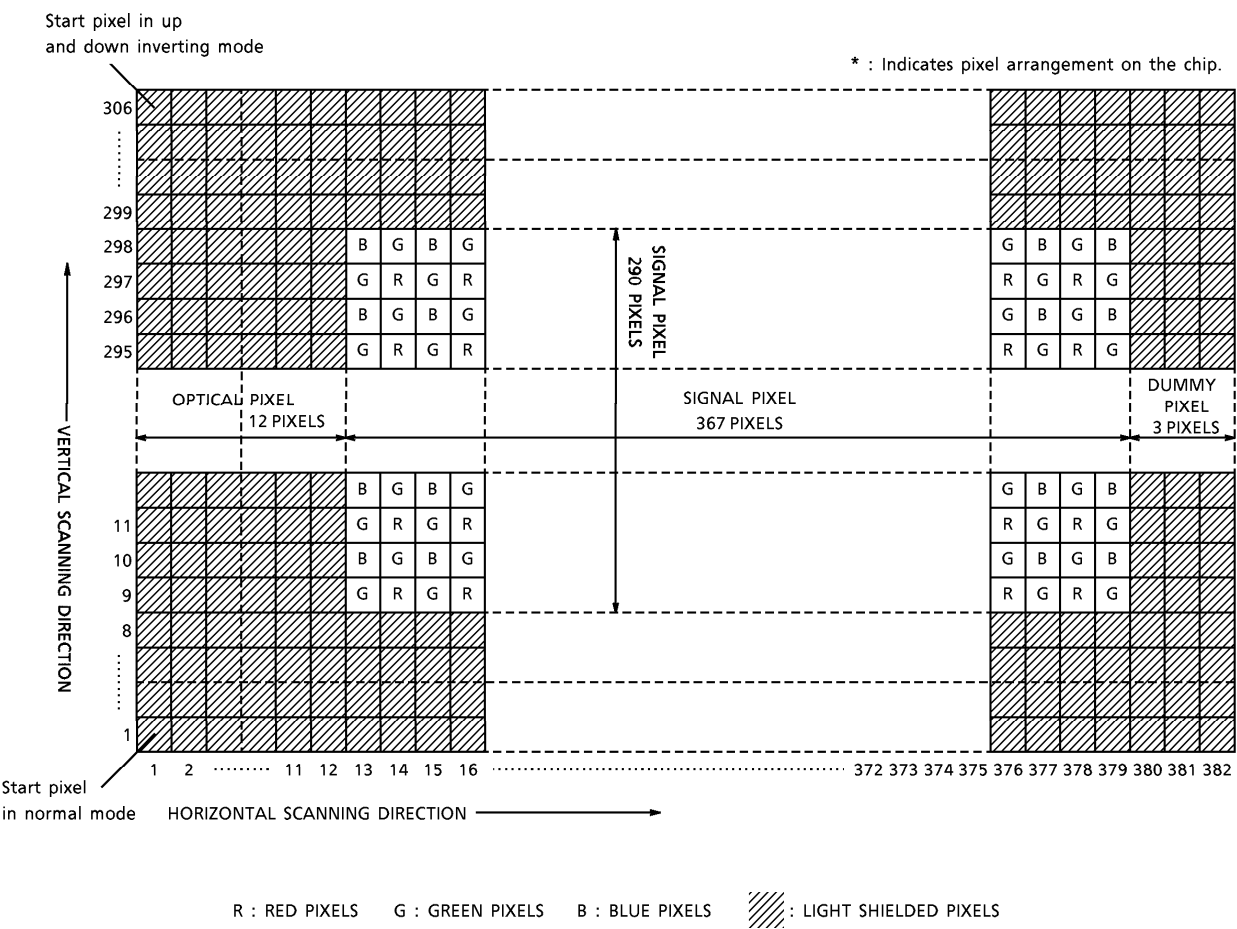
OPTICAL AND ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Sensitivity (G)	R (G)	Standard conditions (*1) G output signal	75	100	—	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, 1st field	—	0	1	mV
Power Supply Current	I _{DD}	V _{DD} = 2.8 V	—	5	10	mA

(*1) : Standard conditions

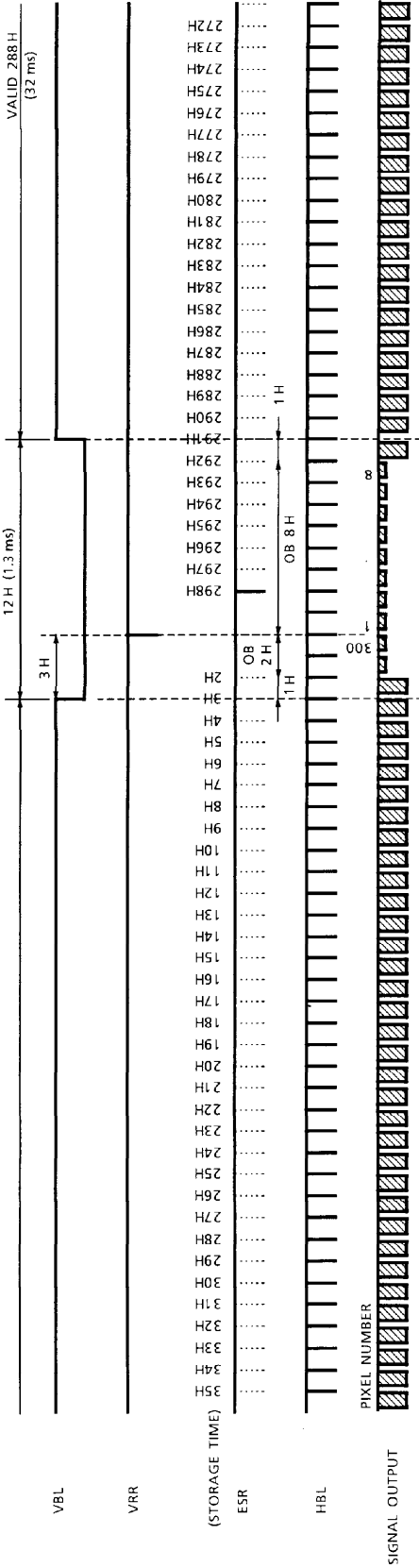
- Light conditions : Color temperature 3200 K halogen light box. Surface brightness: 100 nt of equal white light.
- IR cut filter
- Optical lens : Focal length f = 2.173 mm
F number F2.8
Field of view H52° / V39°
MTF 80 lines in central
32 lines around
TV distortion - 2.8%
- Frame frequency : 30 Hz continual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

PIXEL ARRANGEMENT

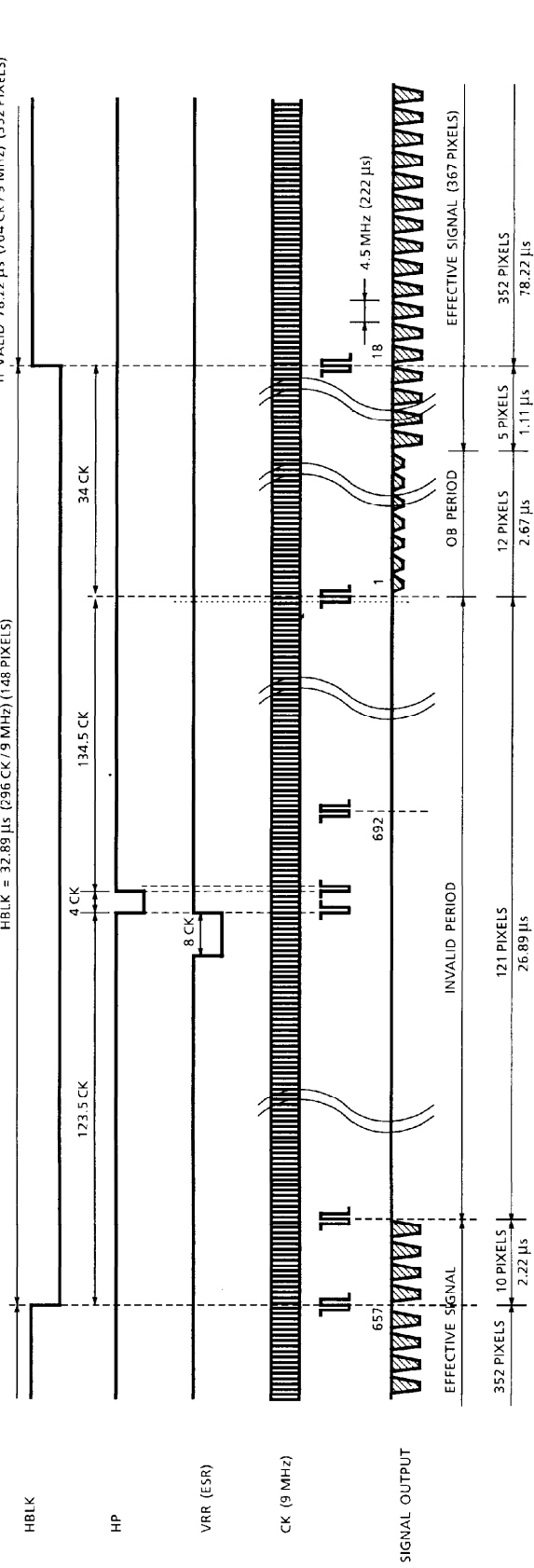


DRIVE TIMING DIAGRAM Progressive scanning mode (30 Hz, 1 V = 300 H)

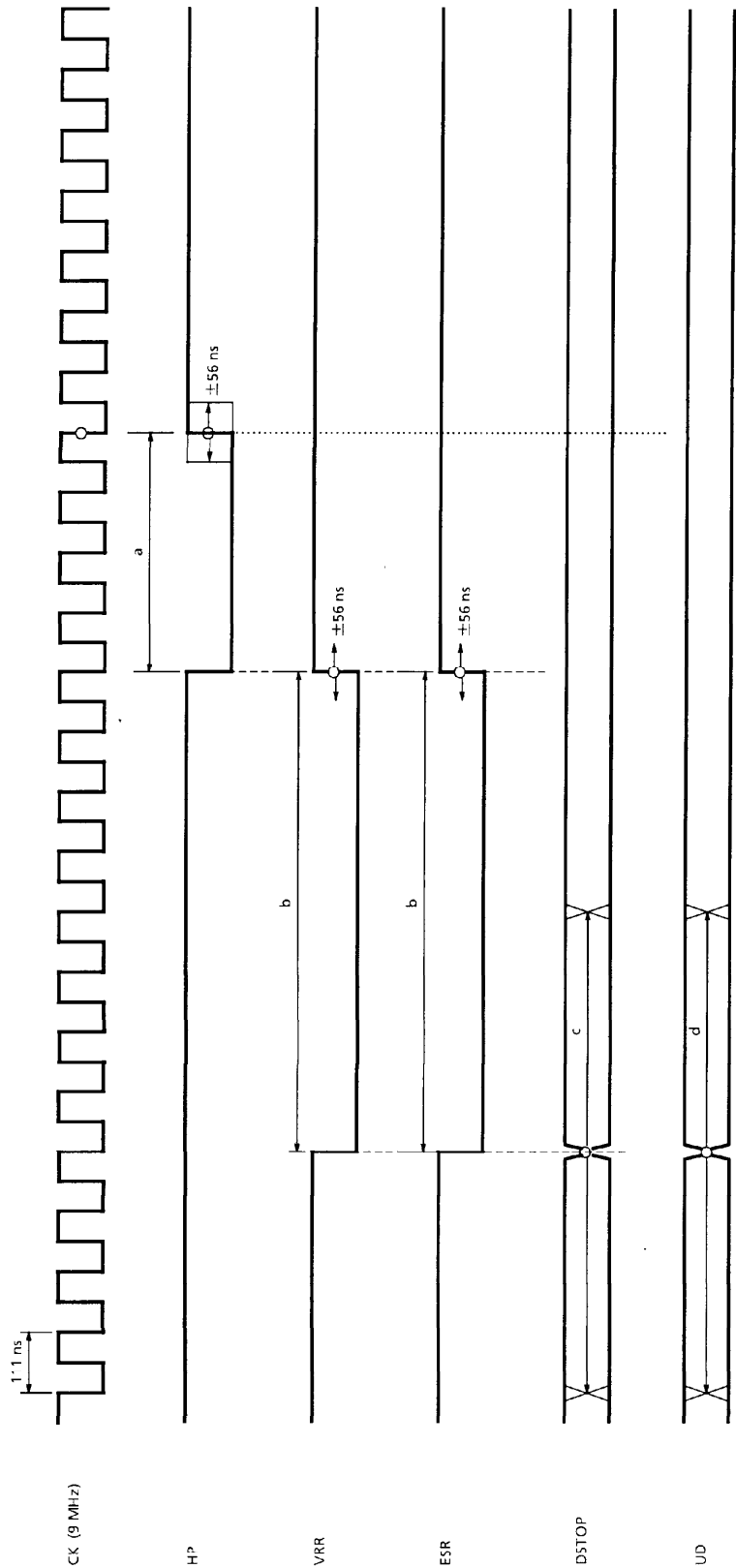
(1) V Blanking



(2) H Blanking



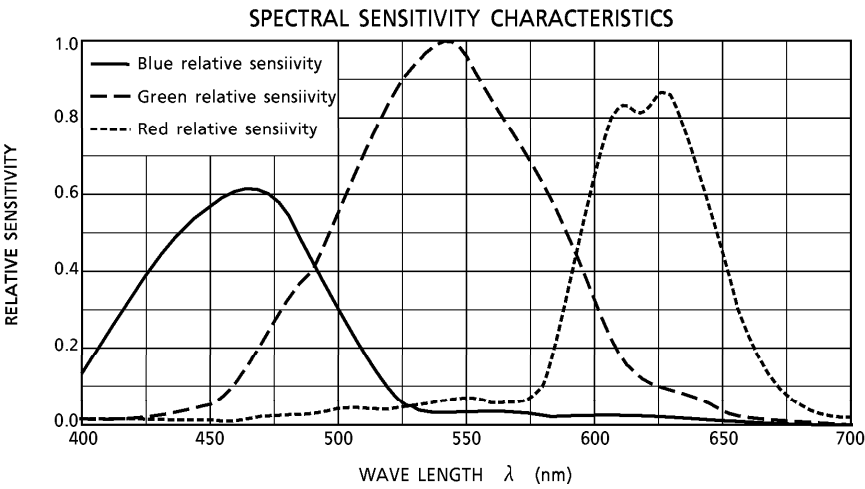
DRIVE TIMING DIAGRAM



Timing Margin (ns)

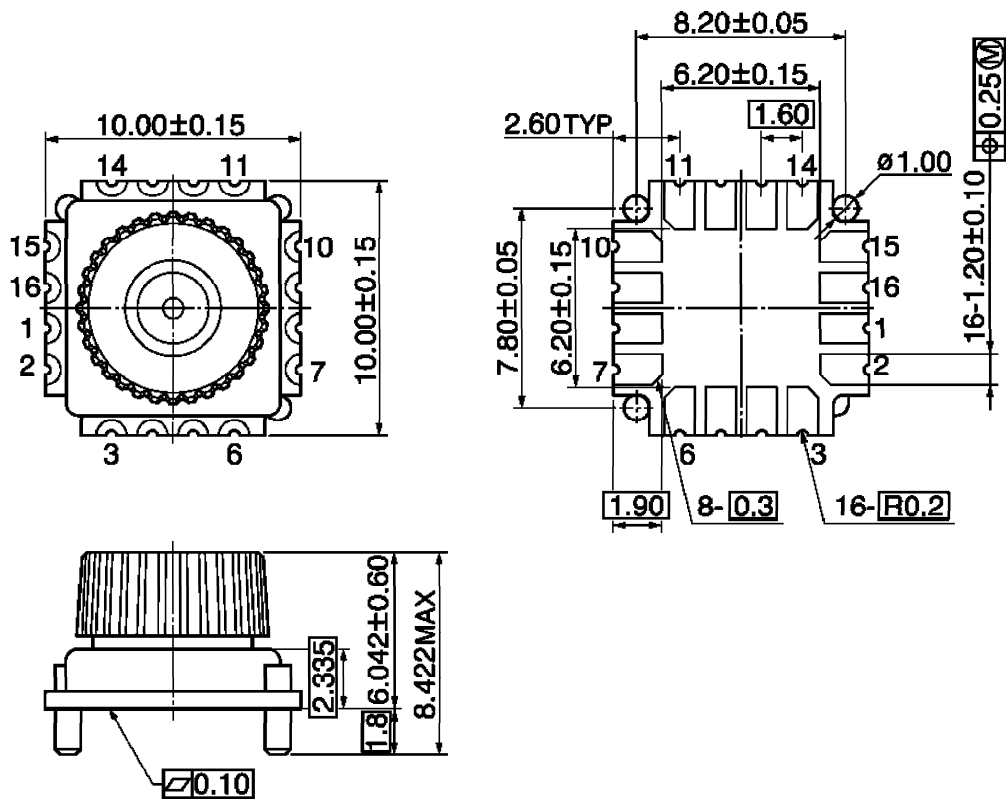
	Min.	Typ.	Max.
a	111	444	
b	222	888	
c	-444	0	444
d	-444	0	444

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



PACKAGE DIMENSIONS
WQFN16-C-S420-1.60

Unit : mm



Weight : 0.5 g (Typ.)