

*Opposing corner 8.99mm(1/1.8type) 5.36 million pixels*

## CCD Area Image Sensor MN39593PJ

### ■ Overview

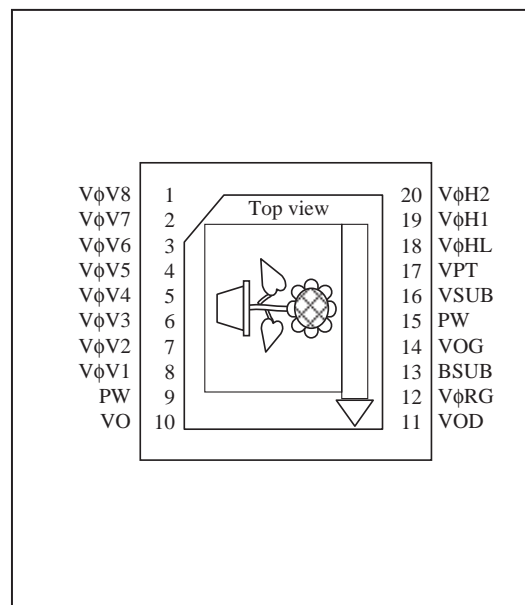
MN39593PJ is a CCD 1/1.8, 5.36 million pixels area image sensor suits high-quality digital still camera. On-chip color filter presents excellent color repeatability by adopting RGB bayer. It also keeps 5.36 million total number of pixels (Horizontally: 2,690 × Vertically: 1,994) to hold stable and high-quality pictures.

### ■ Features

- Available pixel number 2,620 (horizontal), 1,984 (vertical)
- Supersensitivity
- Low-smear
- Square pixel alignment
- Lower power consumption by adopting horizontal CCD, 3.3V
- 16-pin plastic package

### ■ Applications

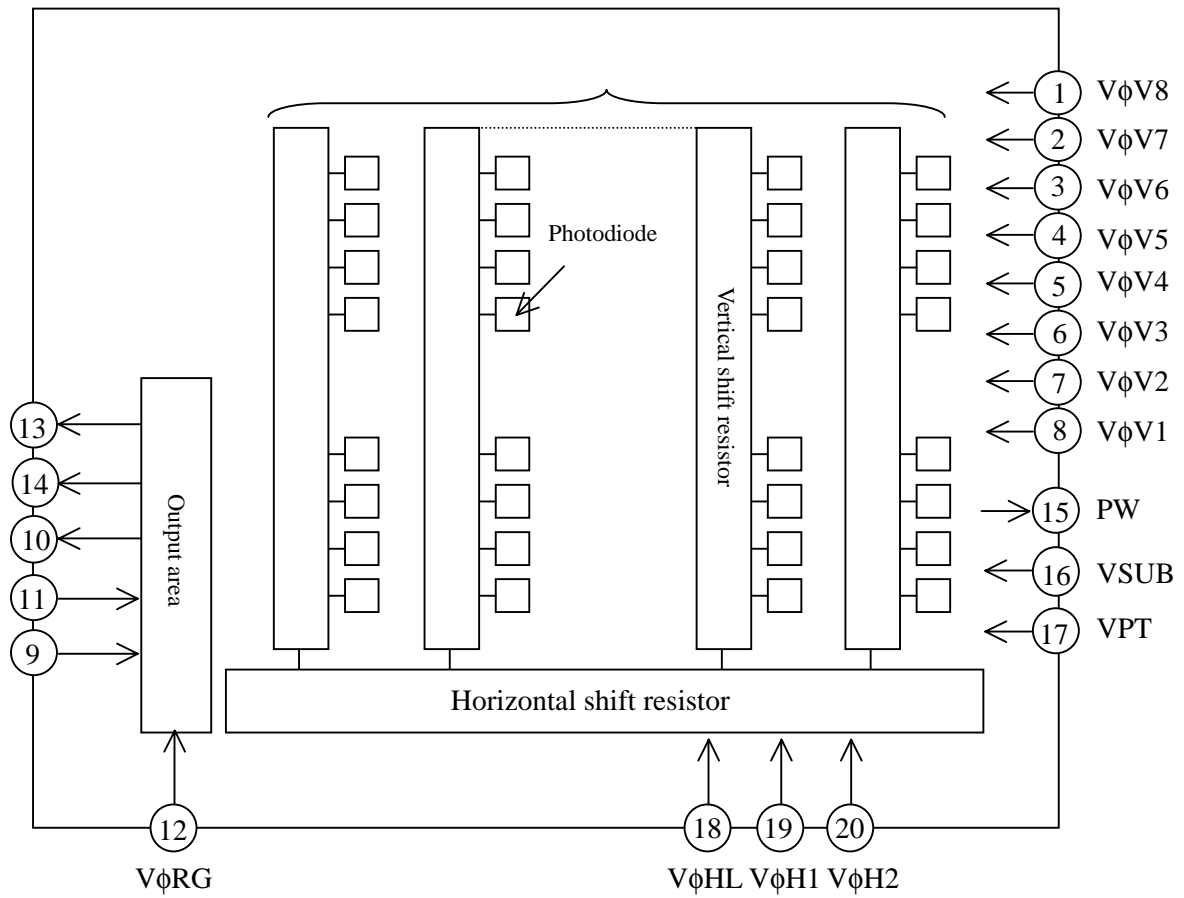
Digital still camera



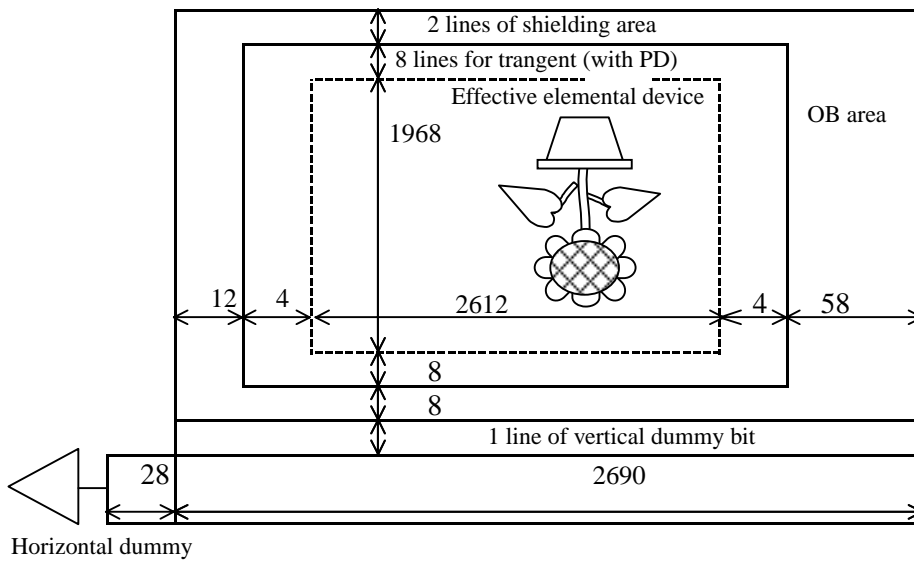
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Semiconductor Company, Matsushita Electric Industrial Co., Ltd.

■ Block Diagram



■ Elemental device structure

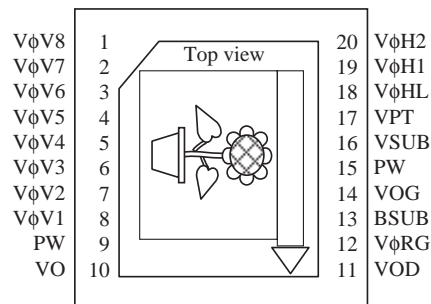


## ■ Terminal description

### 1. Terminal description

Terminal No	Name	Terminal description
1 pin	VφV8	Vertical shift register clock pulse (4)
2 pin	VφV7	Vertical shift register clock pulse (6)
3 pin	VφV6	Vertical shift register clock pulse (3)
4 pin	VφV5	Vertical shift register clock pulse (2)
5 pin	VφV4	Vertical shift register clock pulse (5)
6 pin	VφV3	Vertical shift register clock pulse (1)
7 pin	VφV2	Vertical shift register clock pulse (1)
8 pin	VφV1	Vertical shift register clock pulse (1)
9 pin	PW	GND
10 pin	VO	CCD output
11 pin	VOD	Output drain
12 pin	VφRG	Reset pulse
13 pin	BSUB	Breeder Vsub
14 pin	VOG	Output gate
15 pin	PW	GND
16 pin	VSUB	Circuit board
17 pin	VPT	Protection P wel
18 pin	VφHL	Terminal horizontal shift resistor clock pulse (Common pulse as VφV1)
19 pin	VφH1	Horizontal shift resistor clock pulse (1)
20 pin	VφH2	Horizontal shift resistor clock pulse (2)

### 2. Alignment of terminals



### 3. Device parameter

Parameter	Numeric value	Unit
Total pixel number	2,690(H) × 1,994(V) = 5,363,860	pcs
Available pixel number (including trantsents)	2,620(H) × 1,984(V) =5,198,080	pcs
Effective pixel numbers	2,612(H) × 1,968(V) =5,140,416	pcs
Pixel size	2.775 × 2.775	μm <sup>2</sup>
Effective picture size	7.2483(H) × 5.4612(V)	mm <sup>2</sup>
Chip size	8.6(H) × 6.9(V)	mm <sup>2</sup>

## ■ Absolute maximum ratings

Terminal name	PW			PT		SUB		Note
	Unit	High	Low	High	Low	High	Low	
VOD	V	15.0	-0.2	-		15.0	-25.0	Note 1,2
VPT	V	0.3	-10.0	Standard		0.3	-35.0	
PW	V	Standard		10.0	-0.2	0.2	-25.0	
Vsub	V	25.0	-0.2	35.0	-0.2	Standard		Note 1
VOG	V	5.0	-0.2	-		5.0	-25.0	
V $\phi$ RG	V	5.0	-0.2	15.0	-0.2	5.0	-25.0	
V $\phi$ H1	V	5.0	-0.2	15.0	-0.2	5.0	-25.0	
V $\phi$ H2	V	5.0	-0.2	15.0	-0.2	5.0	-25.0	
V $\phi$ V1,3,5, 7,8	V	15.0	-10.0	25.0	-0.2	15.0	-35.0	
V $\phi$ V2,4,6	V	12.0	-10.0	22.0	-0.2	12.0	-35.0	
VO	V	15.0	-10.0	-		15.0	-35.0	Note 2

## ■ Absolute maximum ratings between gates

Terminal name	Unit	High	Low	Note
Horizontal clock input terminal (between V $\phi$ V1 and V $\phi$ V8)	V	15.0	-9.0	Note 3
Vertical clock input terminal (between V $\phi$ H1 and V $\phi$ H2)	V	5.0	-5.0	
V $\phi$ H1-V $\phi$ V4	V	13.0	-13.0	

## ■ Operation temperature

Parameter	Unit	High	Low	Note
Operation temperature	°C	60	-10.0	

Note 1. If the shutter flushing pulse is not outputted, keep VOD-Vsub 10V.

Note 2. Always keep VOD-VO 5V.

Note 3. When clock width < 10 $\mu$ s, Dudy<0.1%, 25V is guaranteed.

## ■ Imaging characteristics

Testing specification (Tentative)

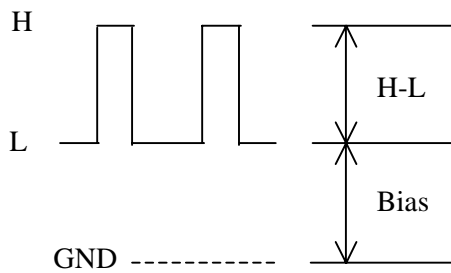
Parameter	Symbol	Condition	Test point	Min.	Standard	Max.	Unit	
Saturation power	Vsat	F1.4:J chart	Signal output	600	650		mV	
Sensitivity	(G)	SoG	F8:J chart (1/7.5 accumulated conversion value)	Signal output	200	240	mV	
	(R)	SoR		Signal output	120	170		
	(B)	SoB		Signal output	85	110		
Sensitivity ratio	R/G	Sensitivity measurement conditions	Signal output		0.71			
	B/G		Signal output		0.46			
Smear	Frame monitors	Sm	1/10V	G signal output		-87 -74	-82 -69	dB
OB bump		60°C light shielding	Signal output	-0.84	0	0.84	mV	
Color shading (1)(2)		Standard light sensitivity	Average signal output		4.0	8.0	%	
Dark signal		Ta=60°C, 1/3.75 second accumulation shielding condition	Signal output		3.0	6.0	mV	
Dark signal shading (H, V)		Ta=60°C, 1/3.75 second accumulation shielding condition	Signal output		4.0	6.0	mV	
Blooming control circuit voltage	Vsub	1000 times more light than normal amount	Monitor	No blooming caused by the inner voltage of Vsub				
φ VH voltage reliability (Shutter with a scratch)		1/8 times more light than normal amount	Monitor	No scratches under the condition of φ VH voltage operation				
OB transmission		One hundred thousand times more light than normal amount	Signal output	Less than 10mV of OB signal output				

Note: above values are testing values only.

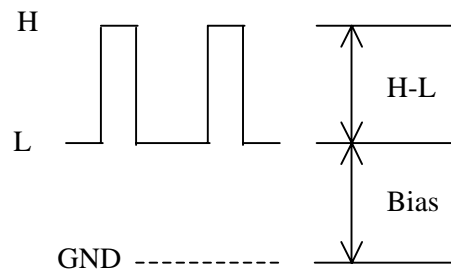
## ■ Clock power voltage conditions

Terminal name		Operating conditions			Note	
		Unit	Max.	Standard		Min.
VOD		V	13.5	12.0	12.5	
VPT		V	-7.0	-8.0	-8.0	
PW		V	-	0	-	
BSUB			Inside			
VOG		V	Inside			
V $\phi$ RG	H-L		3.6	3.3	3.0	Note 1
	Bias	V	Inside			
V $\phi$ H1	H	V	3.6	3.3	3.0	Note 3
	L	V	0.2	0	-0.2	
V $\phi$ H2	H	V	3.6	3.3	3.0	
	L	V	0.2	0	-0.2	
Vsub	Bias	V	Inside			Note2
	$\phi$ Vsub	V	21.5	20.5	19.5	
V $\phi$ V1, V $\phi$ V3, V $\phi$ V5, V $\phi$ V7, V $\phi$ V8	H	V	13.5	13.0	12.5	Note 4
	M	V	0.2	0	-0.2	
	L	V	-7.0	-7.5	-8.0	
V $\phi$ V2, V $\phi$ V4, V $\phi$ V6	M	V	0.2	0	-0.2	
	L	V	-7.0	-7.5	-8.0	

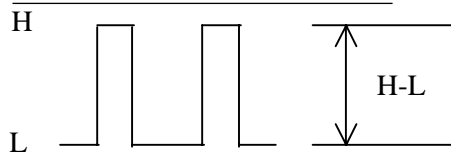
Note 1) Reset (V $\phi$ RG)



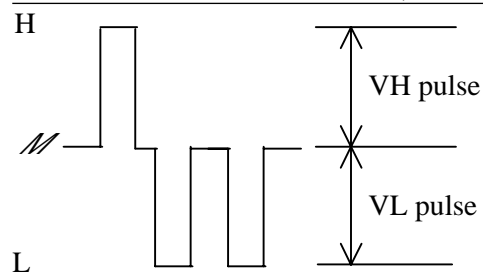
Note 2) Circuit board (V $\phi$ VSUB)



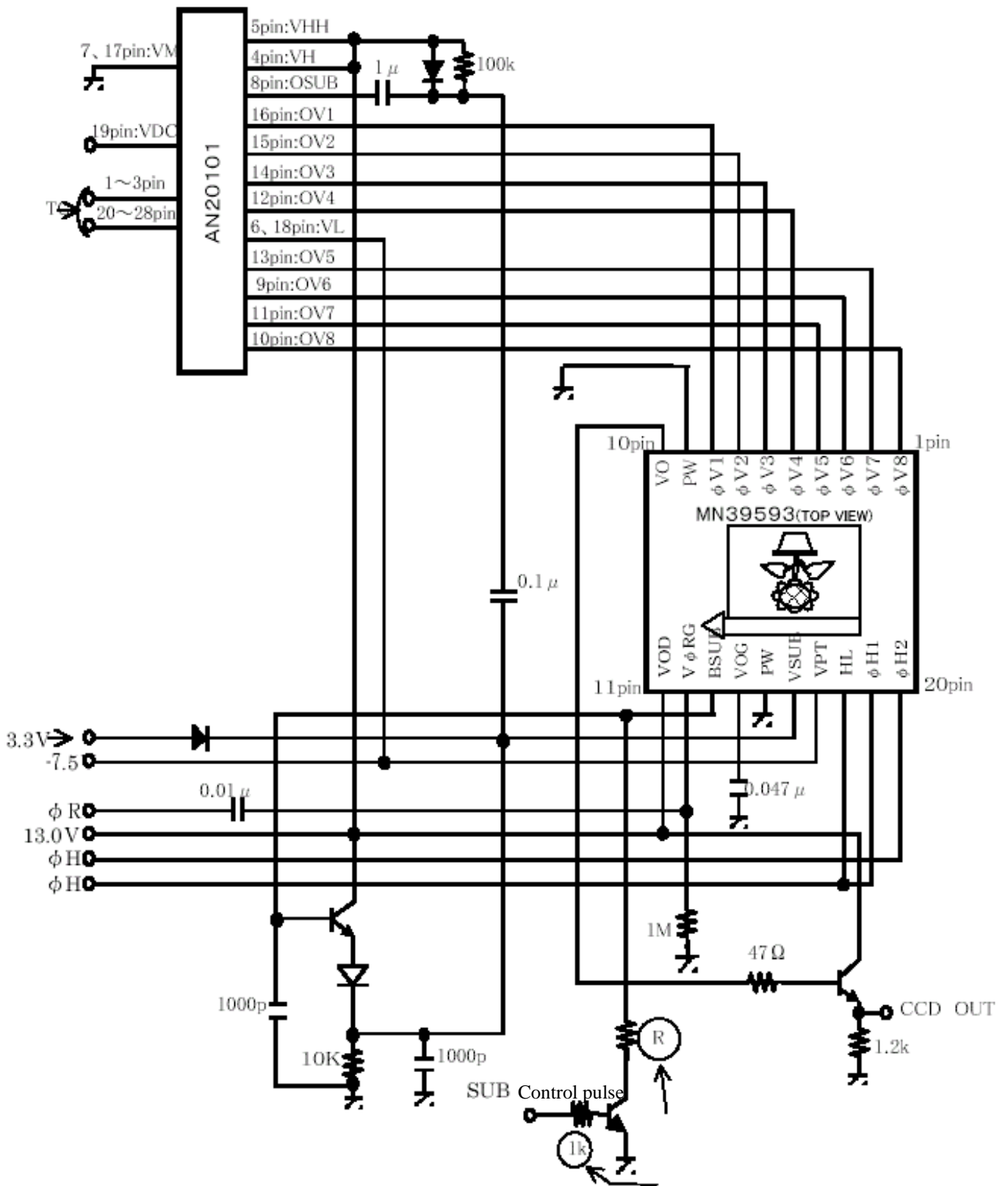
Note 3) Horizontal shift resistor (V $\phi$ H1, V $\phi$ HL, V $\phi$ H2)



Note 4) Vertical shift resistor (V $\phi$ V1 to V8)



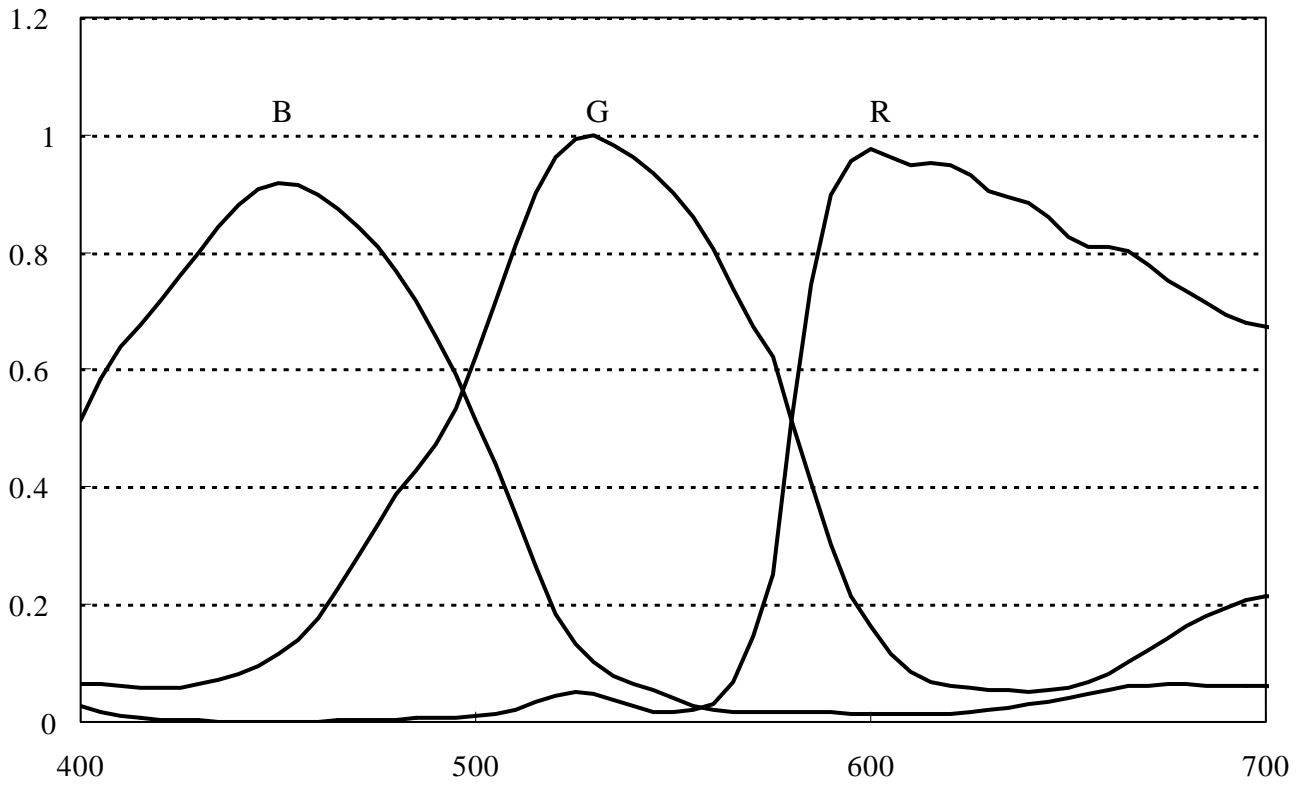
■ Recommended circuit example



Note)The value of Corrector resistance will be indicated.

Adjustment of Base resistance 1kW is required depending on the ability of current supply of SUB control pulse output circuit.

■ Characteristics of prismatic





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