PRODUCT NUMBER: HML3530

DESCRIPTION: L5363 × 3 ELEMENT LINEARIMAGE SENSOR

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REVISED DATA:

*THIS SPECIFICATION ARE SUBJECT TO BE CHANGED WITHOUT NOTICE.

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HML3530

L5363 ELEMENTS LINEAR IMAGE SENSOR

GENERAL DESCRIPTION

◆The HML3530 is a low power and high sensitive color linear image sensor with 5363 × 3 elements of sensor.
The sensor size is 8μm × 8μm on 8μm pitch and the distance between two sensor line is 64μm. The device is operated by 12V power supply and 5V puls .
The device are manufactured using charge coupled device P-WELL buried-channel technology.

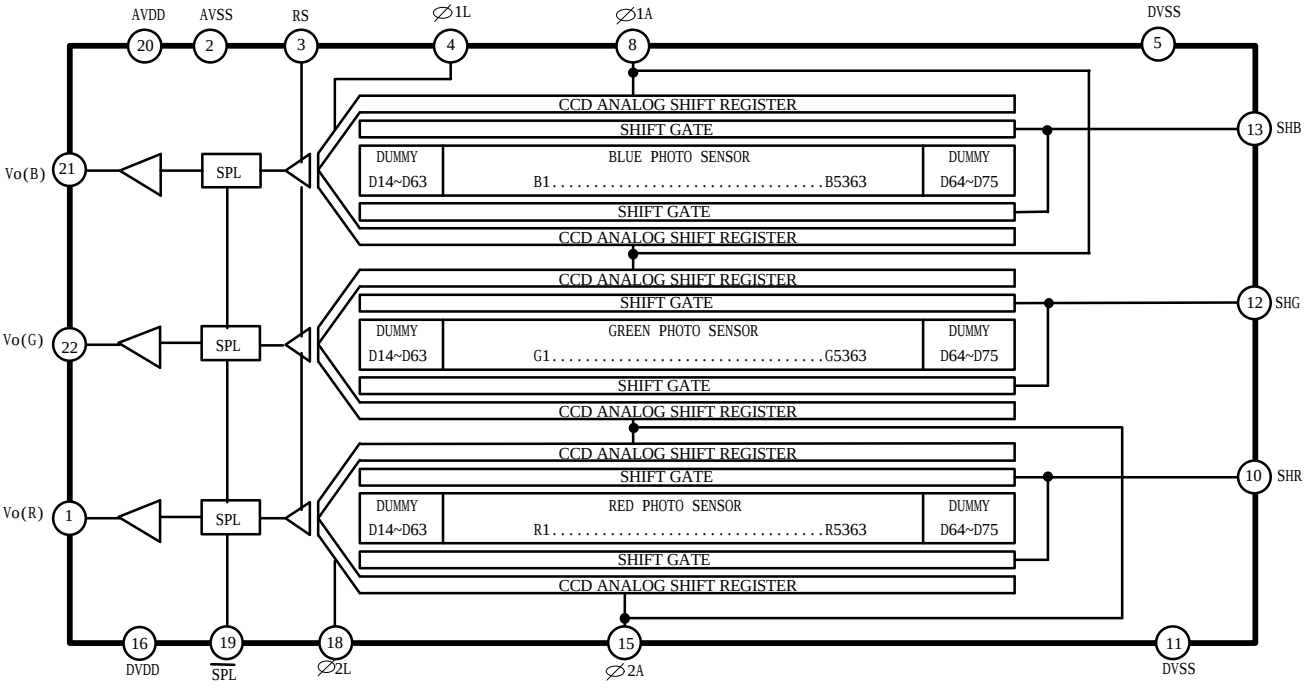
APPLICATIONS

◆color image scanner 600DPI for A4 size documents.
◆color image scanner 400DPI for A3 size documents.

FEATURES

◆5363´3 elements of image sensor.
◆sensor size 8mm ´8mm on 8mm pitch .
◆ sensor line spacing 64mm
◆operation frequency(max) : 3MHZ.
◆high sensitive pin photodiode
◆2 phase clocking.
◆12V DC power, 5V pulse clocking.
◆built in sample and hold circuit
◆red , green , blue three output
◆22 pin plastic package

CIRCUIT DIAGRAM



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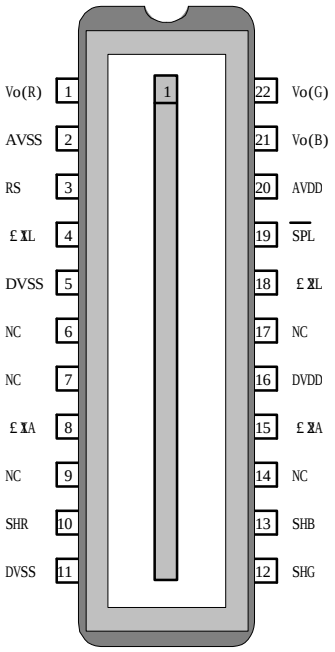
L5363 ELEMENTS LINEAR IMAGE SENSOR

PIN ASSIGNMENT



PIN DESCRIPTION		
Pin NO	Name	Description
1	Vo(R)	Red signal output
21	Vo(B)	Blue signal output
22	Vo(G)	Green signal output
16	DVDD	Digital DC power supply
20	AVDD	Analog DC power supply
5 , 11	DVSS	Digital Ground
2	AVSS	Analog Ground
3	RS	Reset gate clock input
4 , 18	ϕ1L, ϕ2L	Final stage clock input
8	ϕ1A	Clock1 pulse gate input
15	ϕ2A	Clock2 pulse gate input
10	SHR	Shift gate clock input
12	SHG	Shift gate clock input
13	SHB	Shift gate clock input
19	$\overline{\text{SPL}}$	Sample and hold clock input
7,9,14,6,17	NC	Nonconnection

ABSOLUTE MAXIMUM RATINGS

Parameter	Rating		
	Min	Max	Unit
Operating temperature	-25	+60	°C
Storage temperature	-40	+80	°C
Operating humidity	35%	80%	at 40°C
Storage humidity	20%	90%	at 40°C
Clock pulse voltage	-0.2	Vdd	V
Shift pulse voltage	-0.2	Vdd	V
Reset pulse voltage	-0.2	Vdd	V
Power supply voltage	-0.2	+13	V

OPTICAL /ELECTRICAL CHARACTERISTICS

Temperature=25°C, Vdd=12V, ϕ1(ϕ2, RS, SH)=5V pulse, f_{CK} =0.5MHZ, f_{RS} =1MHZ, Tint =10ms

, Load resistance=100KΩ, Light source = 3200°K halogen lamp +CM500(infrared IR cutoff filter)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Responsivity	Rred	4.0	5.8	7.5	$V/lx \bullet sec$	
	Rgreen	4.0	5.8	7.5	$V/lx \bullet sec$	
	Rblue	2.8	4	5.2	$V/lx \bullet sec$	
Dynamic range	DR	---	3200	---		1
Saturation Voltage	Vsat	2	3.2	---	V	2
Saturation exposure	SE_R		0.91		lx•sec	2
	SE_G		0.91		lx•sec	2
	SE_B	---	1.1	---	lx•sec	2
Total transfer efficiency	TTE	92	96	---	%	
Output impedance	Z	---	450	1000	Ω	
DC power dissipation	P	---	250	500	mW	
Photorespons non-uniformity	PRNU1	---	6	20	%	3
Photorespons non-uniformity	PRNU2	---	6	20	%	3
Register imbalance	RI	---	60	80	mV	4
Dark signal voltage	DS	---	2	5	mV	5
Dark signal non-uniformity	DSNU	---	---	10	mV	6
Output DC level	Vo	4.5	5.0	6.5	V	7
Linearity inequality	Li		3	10		8

NOTE:

1.Dynamic range (DR):

Dynamic range is defined as

$$DR = \frac{V_{SAT}}{DS}$$

* DS is proportional to Tint (integration time)

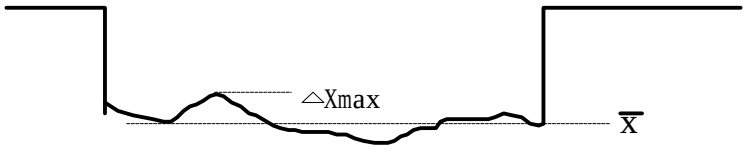
2.Saturation voltage (Vsat) and Saturation exposure(SE):

Vsat is defined as the minimum saturation output voltage of all effective pixels.

And the saturation exposure is defined as follows

$SE = \frac{V_{sat}}{R}$ where R indicates Rred , Rgreen, Rblue, and SE indicates SE_R, SE_G, SE_B.

3,Photorespons nonuniformity (PRNU):



PRNU1 is defined as $PRNU1 = \frac{\Delta X_{max}}{\overline{X}} \times 100\%$

$\overline{X}$ is average of total output signal ,

ΔX_{max} is the maximum deviation from $\overline{X}$

PRNU2 is defined as $PRNU2 = \frac{\Delta X_{next}}{\overline{X}} \times 100\%$

ΔX_{next} is maximum difference of next pixel

4.Register Imbalance (RI):

RI is defined as follows

$$RI = \frac{\sum_{1}^{5362} \left| X_n - X_{n+1} \right|}{5362 \times \overline{X}} \times 100\%$$

Where X_n and X_{n+1} are output signal of each pixel .

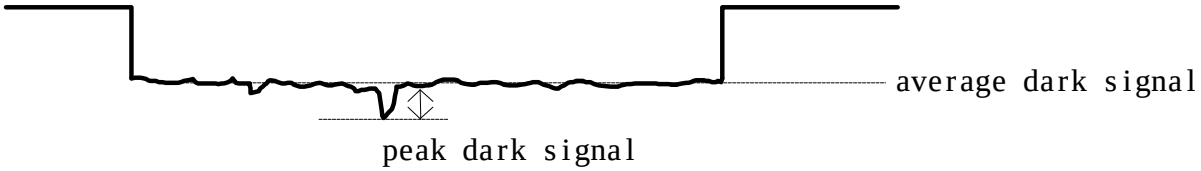
$\overline{X}$ is average of total output signal.

5,Dark signal voltage (DS):

Dark signal is defined as average dark signal voltage of all effective pixels under room temperature 25°C, and integration time 10ms.

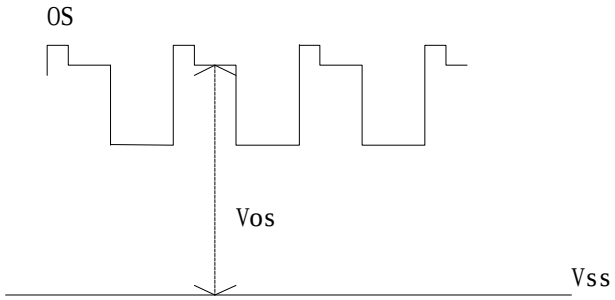
6.Dark signal nonuniformity (DSNU):

The DSNU is defined as the different dark voltage between the peak voltage and average voltage under room temperature 25°C and integration time 10ms.



7.Output DC level (Vo):

Output DC level is defined as



8.Linearity inequality:

Li is define as the output signal maximum ration of difference channel.

When the illumination is 30 lux and 15 lux.

$$Li_R = \frac{V_{R\ 15lux}}{V_{R\ 30lux}} \times 255 - \frac{V_{G\ 15lux}}{V_{G\ 30lux}} \times 255$$

$$Li_G = \frac{V_{G\ 15lux}}{V_{G\ 30lux}} \times 255 - \frac{V_{B\ 15lux}}{V_{B\ 30lux}} \times 255$$

$$Li_B = \frac{V_{B\ 15lux}}{V_{B\ 30lux}} \times 255 - \frac{V_{R\ 15lux}}{V_{R\ 30lux}} \times 255$$

$$Li = Maximum(|Li_R|, |Li_G|, |Li_B|)$$

OPERATING CONDITION

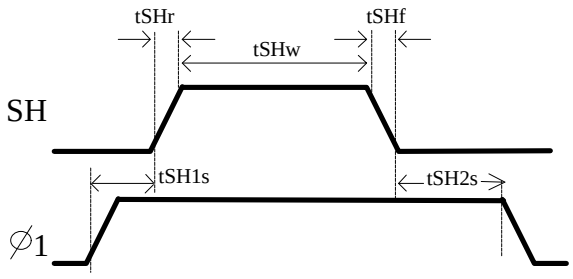
Characteristic		Symbol	Min	Typ	Max	Unit
Final clock pulse voltage	H-level	ϕ1L, ϕ2L	4.5	5.0	Vdd	V
	L-level		-0.2	0	0.5	V
Clock pulse voltage	H-level	ϕ1, ϕ2	4.5	5.0	Vdd	V
	L-level		-0.2	0	0.5	V
Shift pulse voltage	H-level	SH	4.5	5.0	Vdd	V
	L-level		-0.2	0	0.5	V
Reset pulse voltage	H-level	RS	4.5	5.0	Vdd	V
S/H pulse voltage	L-level	$\overline{SPL}$	-0.2	0	0.5	V
Power supply voltage		Vdd	11	12	13	V

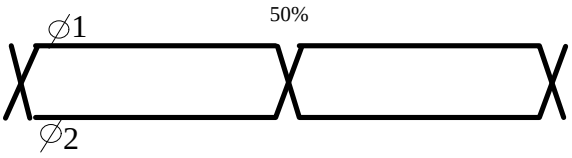
CLOCK CHARACTERISTICS

Temperature 25°C

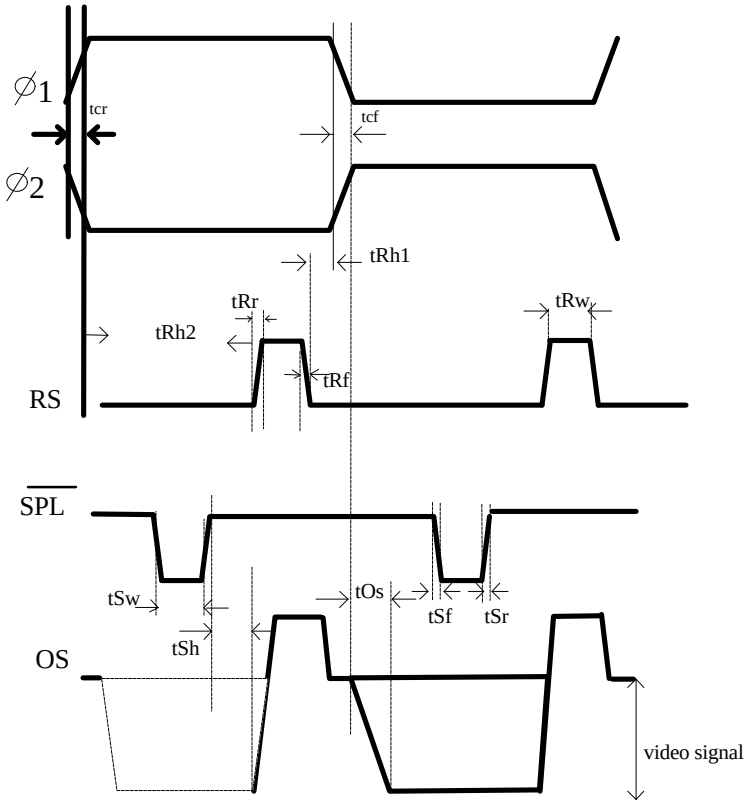
Parameter	Symbol	Min	Typ	Max	UNIT
Clock pulse frequency	fϕ1L, fϕ2L fϕ1, fϕ2	0.05	0.5	1.5	MHZ
Reset pulse frequency	f_{RS}	0.1	1	3	MHZ
Clock capacitance	C_{f1L}, C_{f2L}	---	15	---	pF
	C_{f1}	---	700	---	pF
	C_{f2}	---	600	---	pF
Shift gate capacitance	C_{SH}	---	15	---	pF
S/H gate capacitance	$C_{\overline{SPL}}$	---	15	---	pF
Reset gate capacitance	C_{RS}	---	15	---	pF

Pulse Timing of SH and ∅1





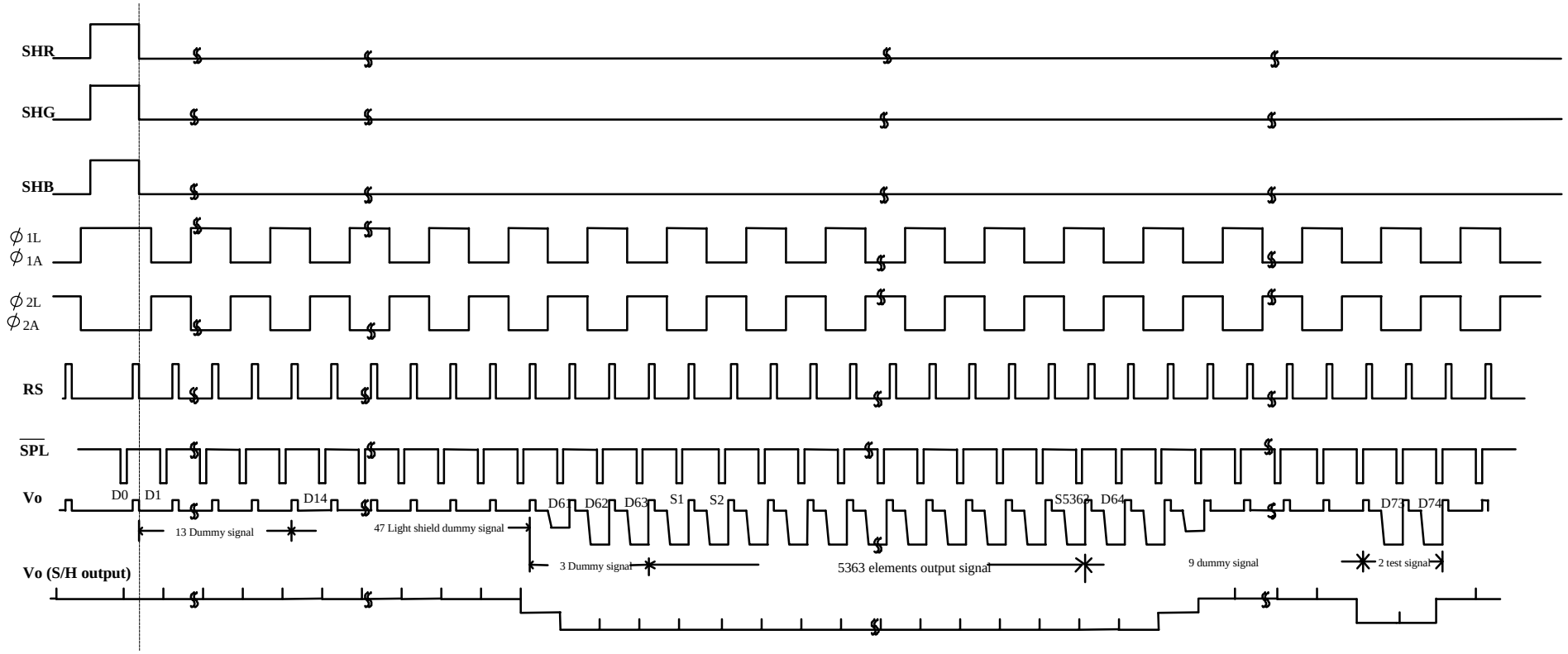
Pulse timing of ∅1 , ∅2 , RS, $\overline{SPL}$ and Vo



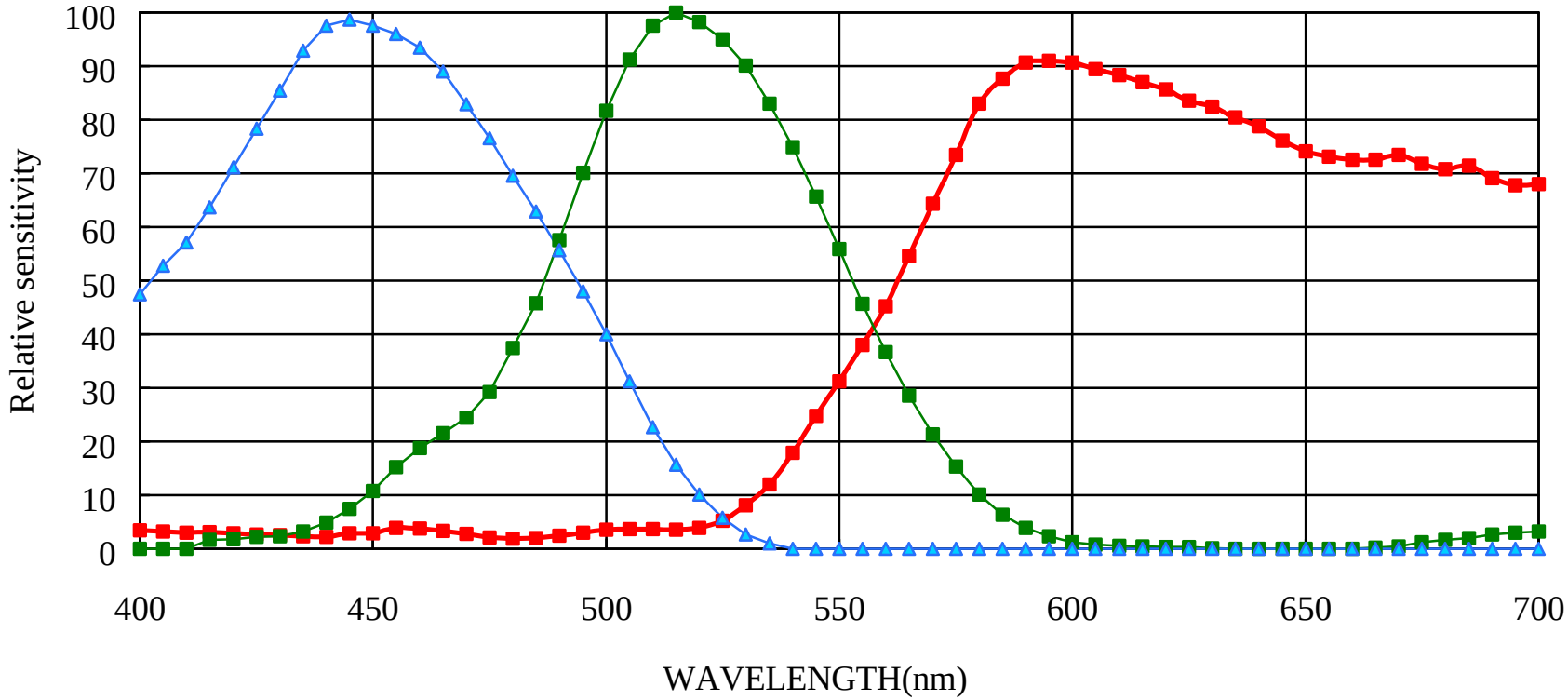
TIMING REQUIRMENT

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Pulse timing of SH and ϕ1	tSH1s, tSH2s	25	100	---	ns
SH pulse rise time¡ Fall time	tSHr, tSHf	0	25	---	ns
SH pulse width	tSHw	1.0	2.0	20.0	μs
ϕ1,ϕ2 pulse rise and fall time	tcr, tcf	0	50	250	ns
RS, $\overline{SPL}$ pulse rise and fall time	tRr, tRf, tSr, tSf	0	20	---	ns
RS pulse width	tRw	60	250	---	ns
$\overline{SPL}$ pulse width	tSw	125	250	---	ns
Pulse time of ϕ1, ϕ2,,RS	tRh1	25	100	---	ns
Pulse time of ϕ1 , ϕ2, RS	tRh2	250	500	---	ns
Pulse time of RS and $\overline{SPL}$	tSh	25	100	---	ns
Video data delay time	tOs	---	50	250	ns

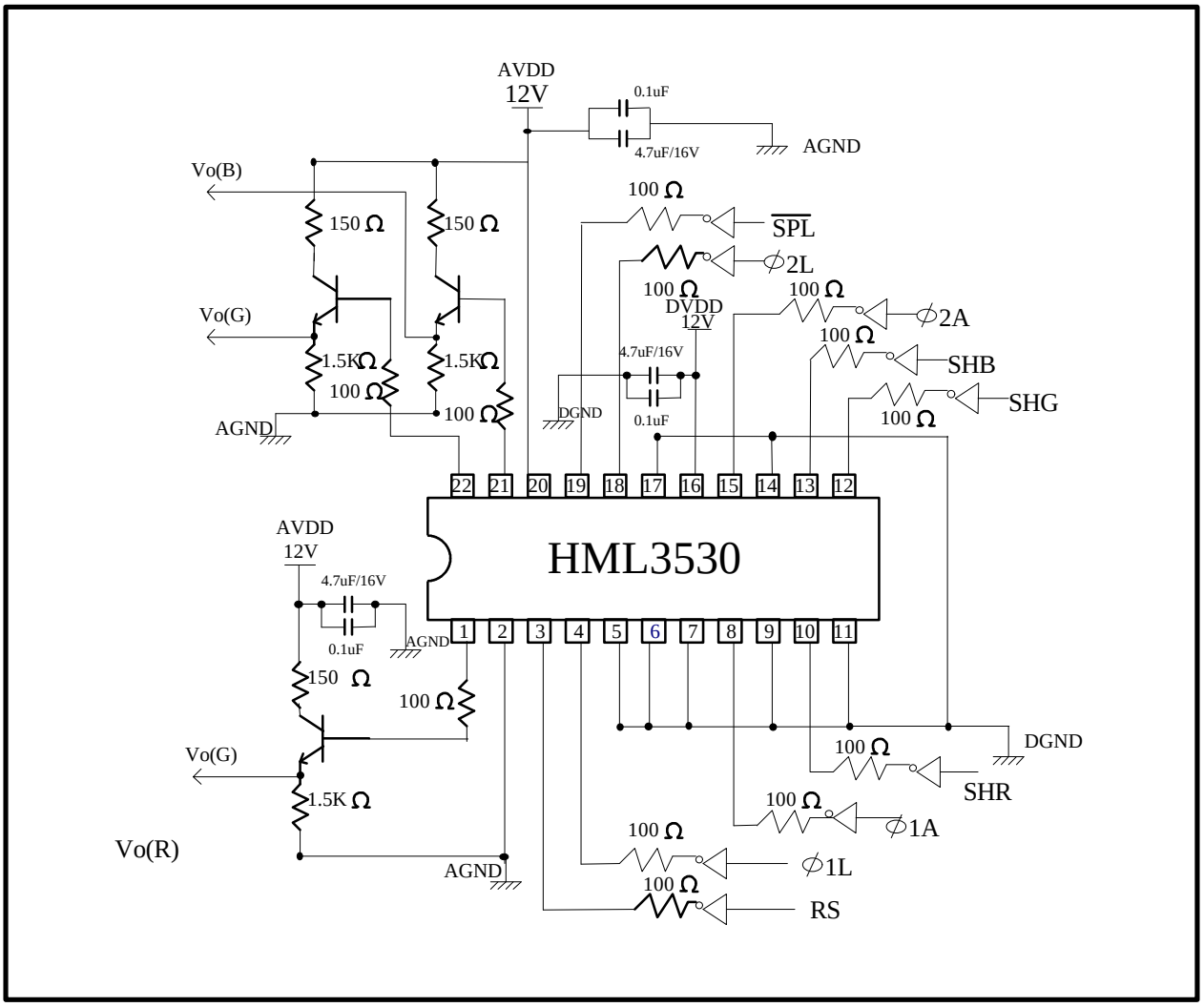
TIMING CHART



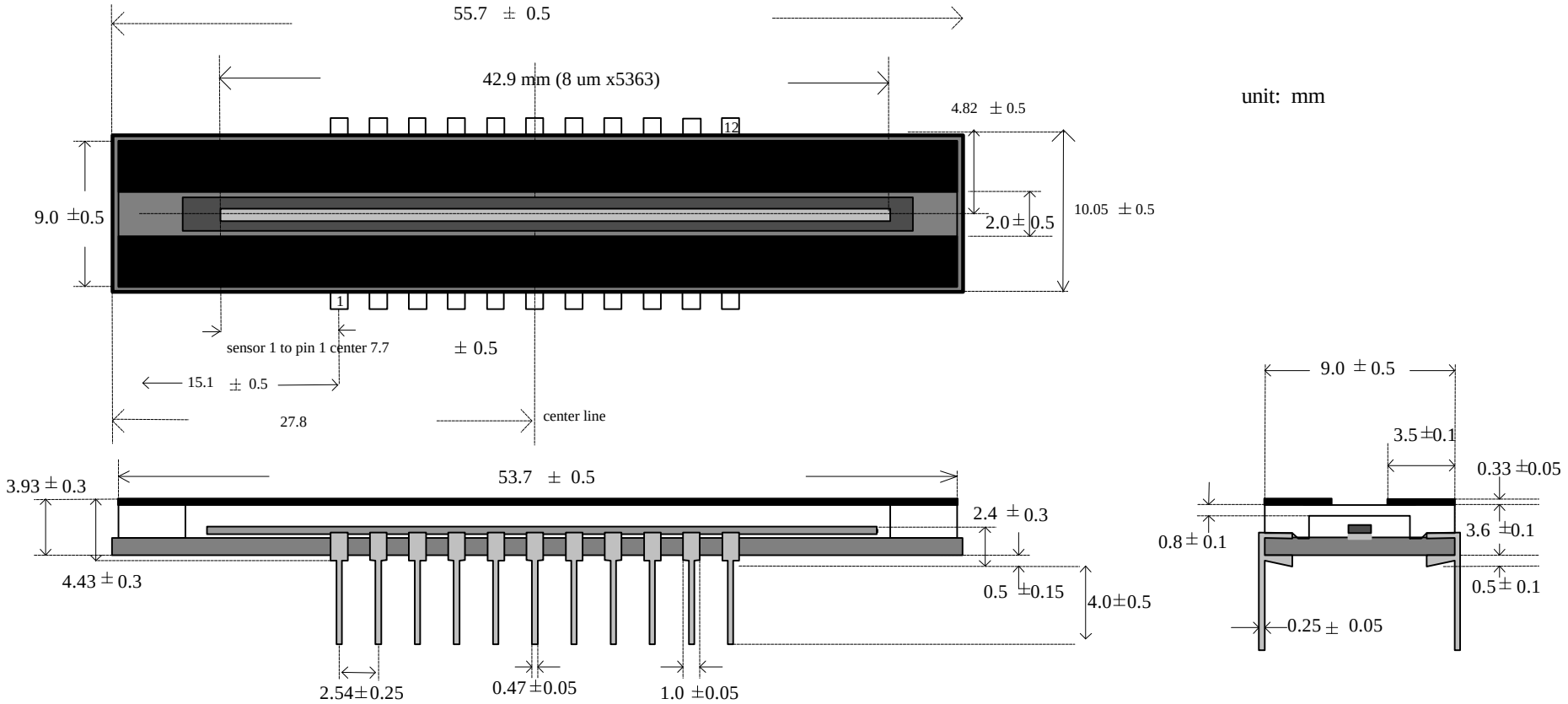
Spectral sensitivity characteristic



APPLICATION CIRCUIT



PACKAGE OUTLINE



package structure

package material	**plastic**
lead material	**alloy**
glass refractive index	**1.51**