光大科技

SPECIFICATION

IMAGE SENSOR MODULE
GM547-H316A4C3

Customer Confirmation		

A	New Edition Released	2021-6-02
Rev.	**Revised Contents**	**Date**

1. DESCRIPTION

The H316A4C3 Contact Image Sensor is a color linear image sensor module. It is suitable for scanning an A4 size document with high resolution for high speed scanner, mark reader and office automation (OA) equipment applications.

2. SPECIFICATION

Description	Specification			Note
Depth of Field	+/- 0.5mm			
Focus Position	0.3 mm			above glass
Effective Scanning Width	218 mm			18.3mm x 12 chips
Total Number of Elements	10368	5184	2592	Pixel
Resolution	1200dpi	600dpi	300dpi	
Line Scanning Time	353.7us	181.0us	94.5 us	@10.0 MHz
Main Clock Frequency	< 10.0 MHz			
Signal Output	3 Analog output			4 chips@ Vout1 4 chips@ Vout2 4 chips@ Vout3
LED Peak Wave Length Page 7	Green（525nm） Red（630nm） Blue（465nm）			IF=20mA
LED Current1 Page 6	Red: 25mA Green: 20mA Blue: 20mA			DC(duty;100%)
LED Current 2	53mA			Pulse (duty;33%)
LED Power Supply(VLED)	5.0 V			
Sensor Power Supply (VDD)	3.3 V			
Input Clock Level	3.3 V			SP & CP
Weight	40 g			
Module Dimensions	231mmx18mmx12.7mm			Page 12

3. FUNCTIONAL BLOCK DIAGRAM

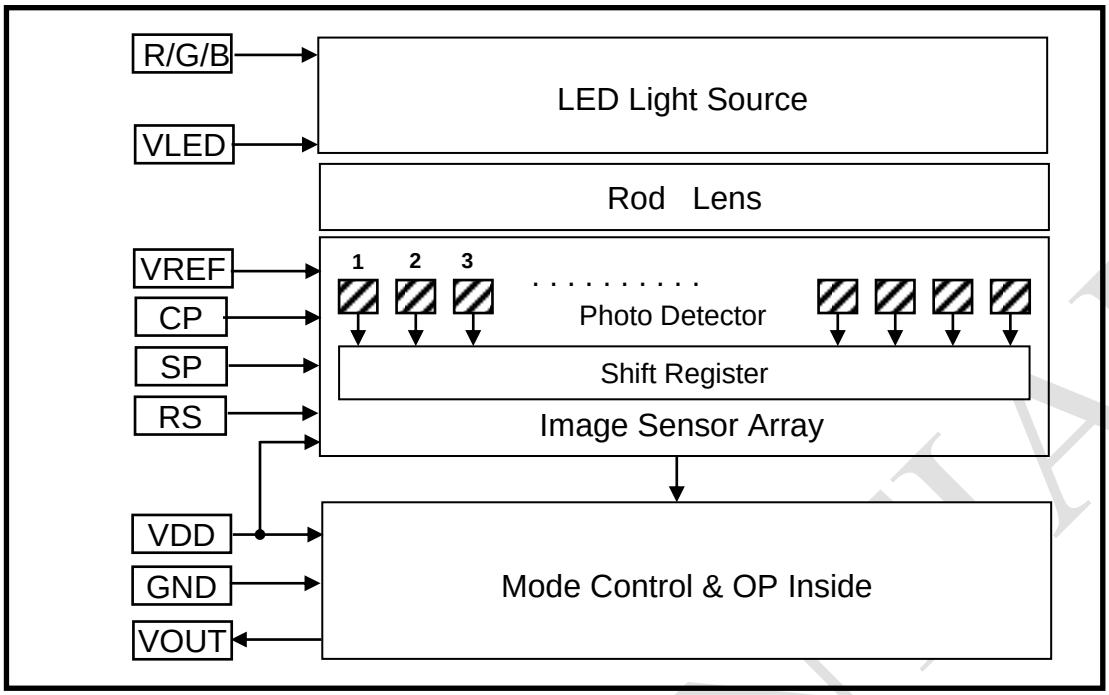


Figure1 Module Block Diagram

Table1. Pin Description

Pin No.	Symbol	Description
1	VOUT1	Output Video Signal
2	GND	Ground (0V)
3	VOUT2	Output Video Signal
4	GND	Ground (0V)
5	VOUT3	Output Video Signal
6	GND	Ground (0V)
7	RS	300 / 600 /1200 dpi Resolution Selectable
8	VREF	Reference voltage for the sensor(1.0V)
9	GND	Ground (0V)
10	CP	Clock Pulse Input
11	VDD	Positive Power Supply Voltage (+3.3V)
12	SP	Start Pulse Input
13	VLED	Common Supply Voltage for LED(+5.0V)
14	LEDB	Cathode Blue LED
15	LEDG	Cathode Green LED
16	LEDR	Cathode Red LED
17	GND	Ground (0V)

Note: FFC and Connector contact whit underside. Pin Pitch = 1.0mm

4. ELECRTO-OPTICAL CHARACTERISTICS (Ta = 25°C)

All shipped modules are tested under the following test conditions

Table2. Operating Conditions and Typical Output Response (25 ºC)

Parameter	Symbol	Min	Type	Max	Unit	Note
Sensor Power Supply Voltage	VDD		3.3		V	
LED Power Supply Voltage	VLED		5.0		V	
Resolution	RS		300		dpi	
Integration Time(one line)	Tint		364		us	4.1
Clock Frequency	CP		5.0		MHz	4.2
Bright Output	Vp	1.0		2.0	V	4.3
Dark Output	Vd	0.8		1.0	V	4.4
Effective Bright Signal Output	Vpc	0.5			V	4.5
Bright Output Non uniformity	Up			50	%	4.6
Dark Non-uniformity	Ud			200	mV	4.7
Modulation Transfer Function	MTF	15			%	4.8

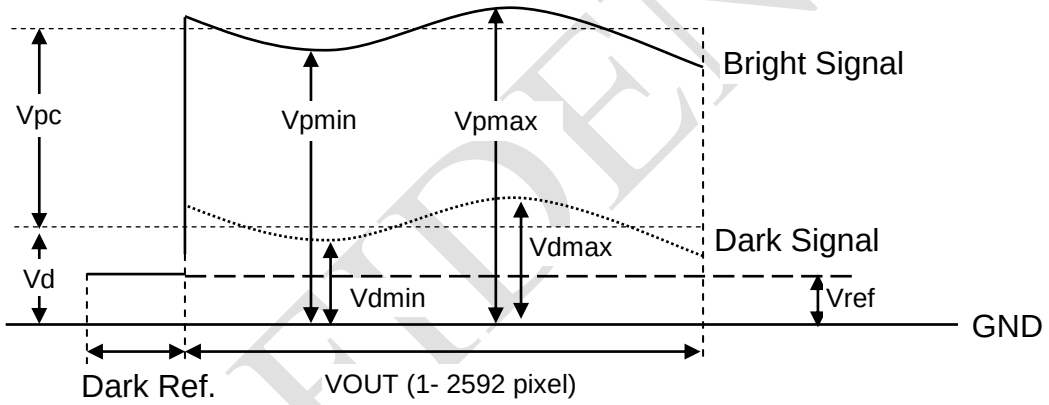


Figure2 Output Signal Waveform in the Dark and White

4.1 Tint is the integration time or line scanning time. Tint is determined by the interval between two start pulses (SP). With CP =5.0MHz, Tint =0.12ms.

4.2 F is the frequency of clock pulse (CP) or pixel rate.

4.3 Vpc(n) is the effective output signal of every pixel and is defined by:

Vpc(n) = Vp(n) –Vd(n)

Vp(n) is the output signal of the nth pixel using a white image target with 0.05 Optical Density (OD).

Vd(n) is the output signal of the nth pixel in the black target.

Dark output is obtained at black target by turning on the LED.

4.4 Upc is the white output non-uniformity with dark signal subtracted and is defined by:

Upc = ((Vpcmax – Vpcmin) / (Vpcmax)) x 100%

Vpcmax = MAX[Vpc(n)]; is the maximum effective output signal

Vpcmin = MIN[Vpc(n)]; is the minimum effective output signal

4.5 Ud = MAX [Vd(n)] - MIN [Vd(n)] ,

where n =11, 12, …2582

4.6 Figure3 shows a typical output response of the module using a MTF image target.
MTF = MIN{ [(Vcmax - Vcmin) / (Vcmax+Vcmin)] } x 100%
Vmax is the maximum output signal using the MTF image target with Correspond to dark signal (Vd) subtracted
Vmin is the minimum output signal using the MTF image target with Correspond to dark signal (Vd) subtracted
MTF image target is 1.92 lp/mm

4.7 Dark compensation is achieved by subtracting the dark level of every pixel.

4.8 For the best performance, two points correction (dark and white) is strongly recommended.

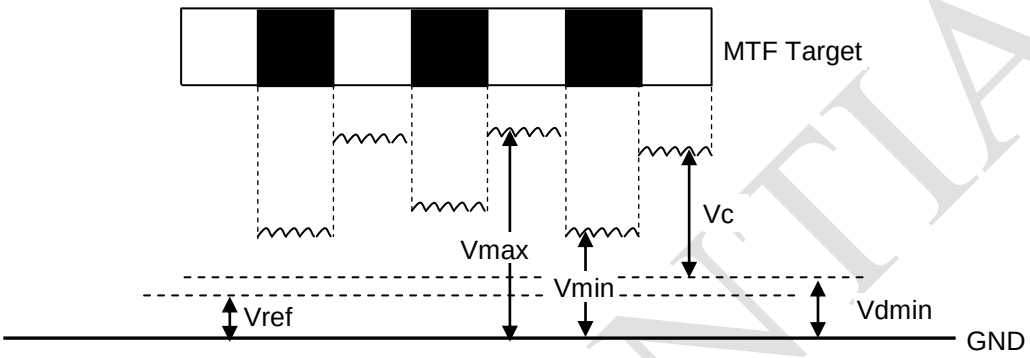


Figure3 Output Signal with MTF test target

Mode	1200 dpi	600 dpi	300 dpi
RS	VDD	GND	SP

5. ELECTRICAL REQUIREMENTS (Ta = 25°C)

Table3. Absolute Maximum Ratings

Parameter	Symbol	Rating	Note
Positive Power Supply Voltage	VDD	+3.6 V	
Positive Power Supply Current	IDD	110	mA
LED Power Supply	I_{LED}	53mAV	
Level Input Voltage	Vin	0 ~ VDD+0.5 V	SP & CP
Temperature	Ta	-25 ~ 65 °C	Storage
		0 ~ 60 °C	Operating
Humidity	Ha	10 ~ 90 %RH	Storage
		10 ~ 85 %RH	Operating

Table4. Recommended Operating Conditions (25℃)

Parameter	Symbol	Min	Type	Max	Unit
Sensor Power Supply	VDD		+3.3		V
	I_{DD}		50		mA
LED Supply Voltage	VLED		5.0		V
	I_{LED}		20	53	mA
Level Input Voltage	Vih	+2.4	+3.3	+3.6	V
	Vil	0	0	+0.8	V
Clock Frequency	CP	1.0		10.0	MHz
Clock Pulse High Duty Cycle	Tw/To	48	50	52	%
Operating Temperature	Top	0		50	°C

Table5. Sel-guide Absolute Maximum Ratings

Item	Specification	Remarks
1.Storage Temperature	-25 ~ +70°C	
2.Operating Temperature	0 ~ 50°C	
3.Storage Humidity	10 ~ 90%	No Condensation
4.Operating Humidity	10 ~ 90%	No Condensation
5.Operating Maximum Current 1	53 mA	Pulse(duty: 33%), Refer to 1)
6.Operation Maximum Current 2	Red : 25mA Green : 20mA Blue : 20mA	DC(duty: 100%), Refer to 2)

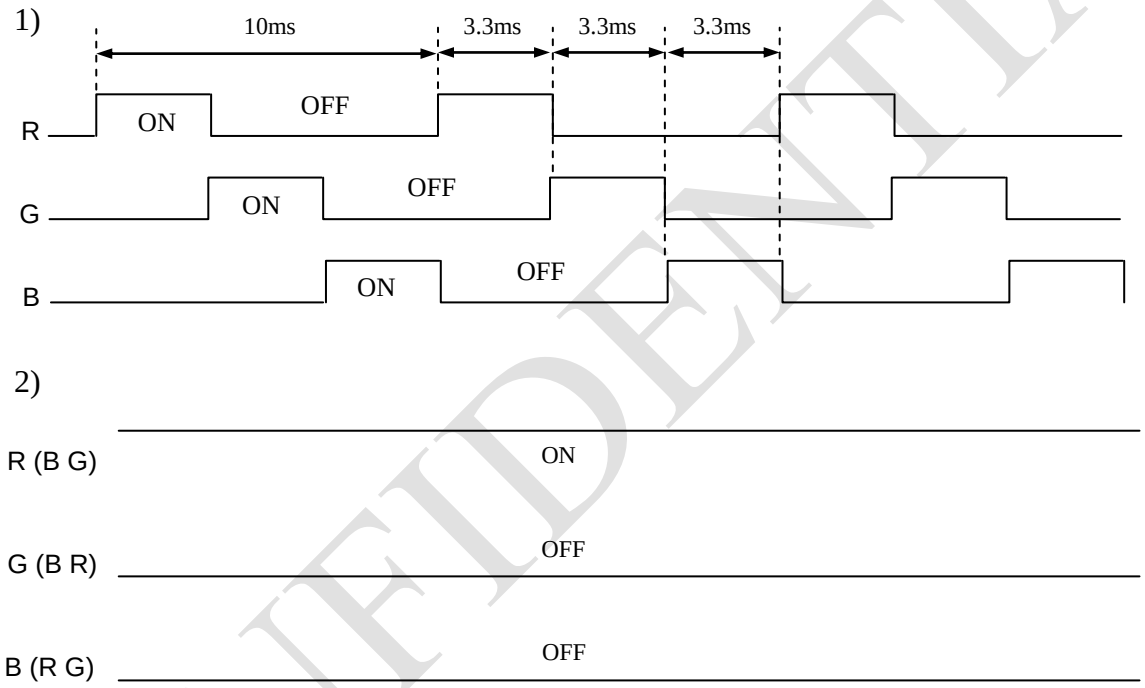


Figure4 Sel-guide Timing Chart in Color Mode

Table6. Optical and Electrical Characteristics (at 25°C)

Item		Specification			Unit	Conditions
		Min.	Typ.	Max.		
1. Effective Width		218	–	–	mm	
2. Power of Illuminance IV	Red	1.03	–	5.15	uW/mm^2	IF=20mA
	Green	1.26	–	6.30		
	Blue	1.44	–	7.20		
3. Uniformity of Illuminace ΔIV	Red	–	–	23	%	
	Green	–	–	23		
	Blue	–	–	23		
4. Peak Wave Length λp	Red	–	630	–	nm	IF=20mA
	Green	–	525	–		
	Blue	–	465	–		
5. Spectrum Width (FWHM) Δλ	Red	–	20	–	nm	IF=20mA
	Green	–	40	–		
	Blue	–	30	–		
6. Dominant Wave Length λd	Red	614	–	633	nm	IF=20mA
	Green	510	–	540		
	Blue	460	–	480		
7. Forward Voltage 1 VF1	Red	1.1	2.1	2.8	V	IF=20mA
	Green	2.0	3.2	3.6		
	Blue	2.0	3.1	3.6		
8. Forward Voltage 2 VF2	Red	1.5	–	3.5	V	IF=20mA
	Green	2.8	–	4.7		
	Blue	2.8	–	4.7		
9. Forward Voltage 3 VF3	Green	2.0	–	–	V	IF=10uA
	Blue	2.0	–	–		
10. Reverse Current IR	Red	–	–	50	uA	VR=5V
	Green	–	–	5		
	Blue	–	–	5		
11. Response (0→90%,100→0%) TR,TF	Red	–	80	–	ns	IF=20mA
	Green	–	70	–		
	Blue	–	70	–		
12. Input Capacitance CI	Red	–	25	–	pF	VF=0V F = 1MHz
	Green	–	100	–		
	Blue	–	100	–		

6. TIME REQUIREMENTS and WITCHING CHARACTERISTICS

Timing Diagram

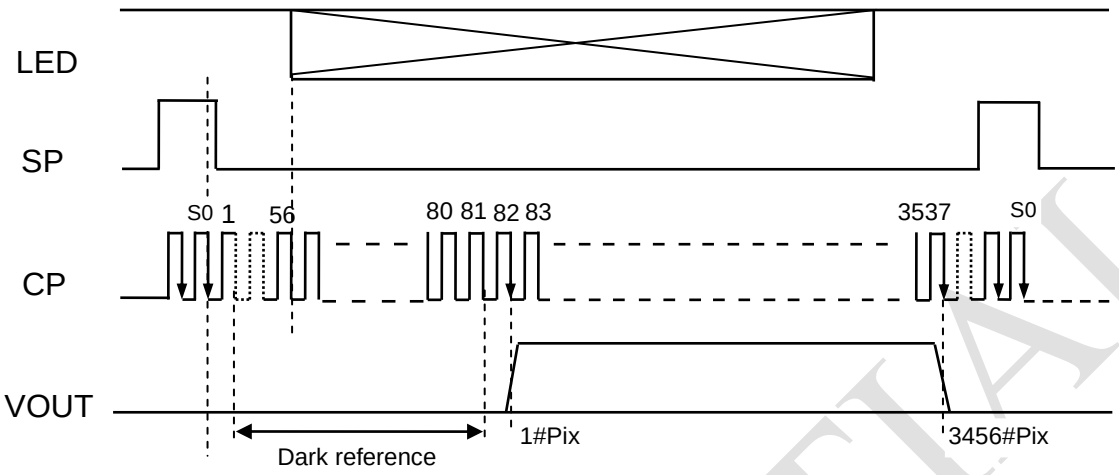


Figure5 1200dpi Mode Timing

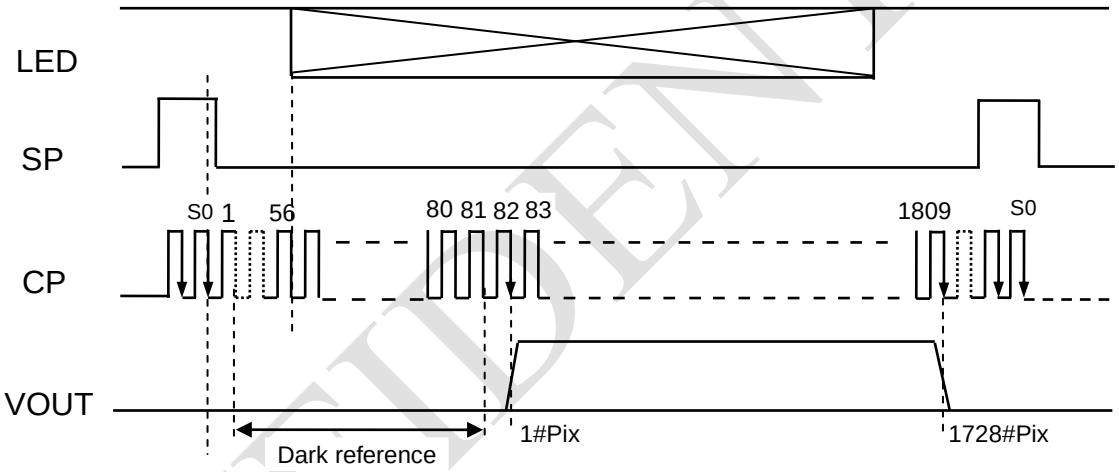


Figure6 600dpi Mode Timing

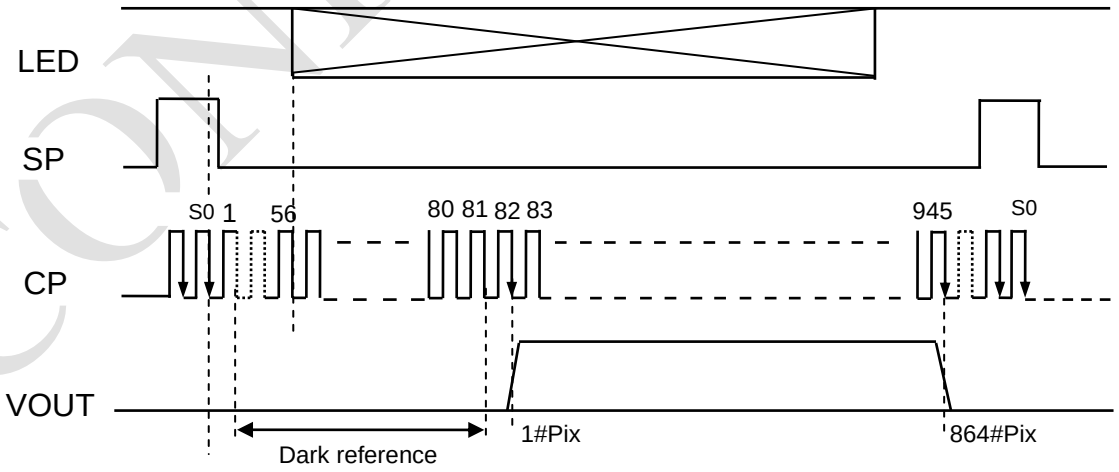


Figure7 300dpi Mode Timing

Remarks: S0 are start clocks. Dark reference sampling (from 1 to 81 clocks)

7. Switching Characteristics

Table7. Switching Characteristics

Parameter	Symbol	Min	Type	Max	Unit
Clock frequency	CP		5.0		MHz
Clock Pulse High Duty Cycle	tw/to	48	50	52	%
Data setup time	Tss	30			ns
Data hold time	Tsh	30			ns
VOUT Delay Time	Td		40		ns
VOUT Stable Time	Ts		70		ns

Timing Chart 1

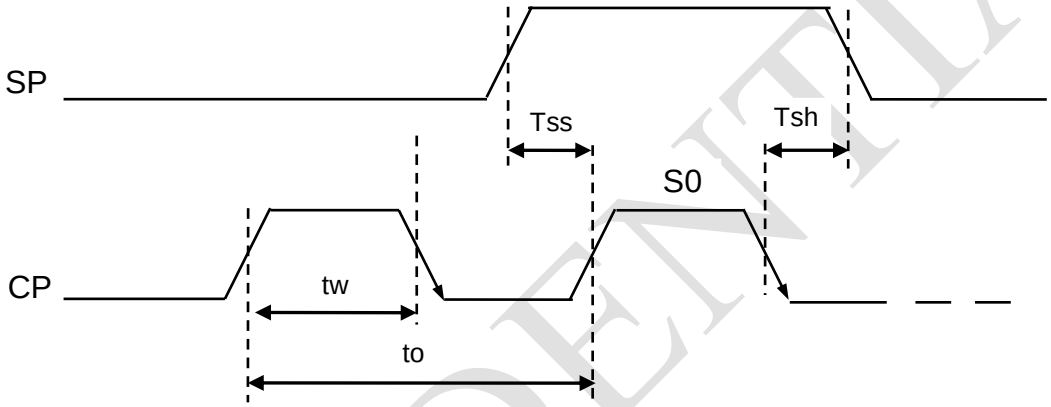


Figure7 Switching Waveforms

Remarks: High level of SP must cover more than 2 clocks

Timing Chart 2

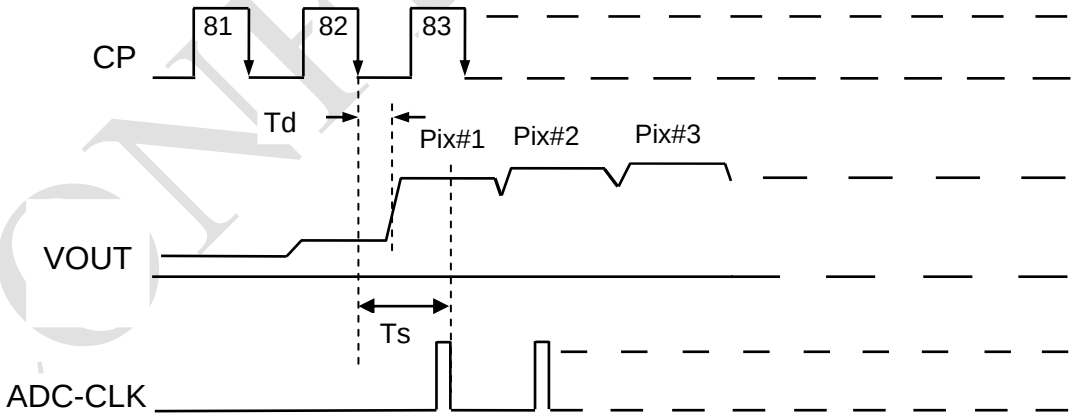


Figure8 VOUT & CP Timing

Remarks: The analog signal of VOUT appear on falling edge of CP (Clock Pulse)

Timing Chart 3

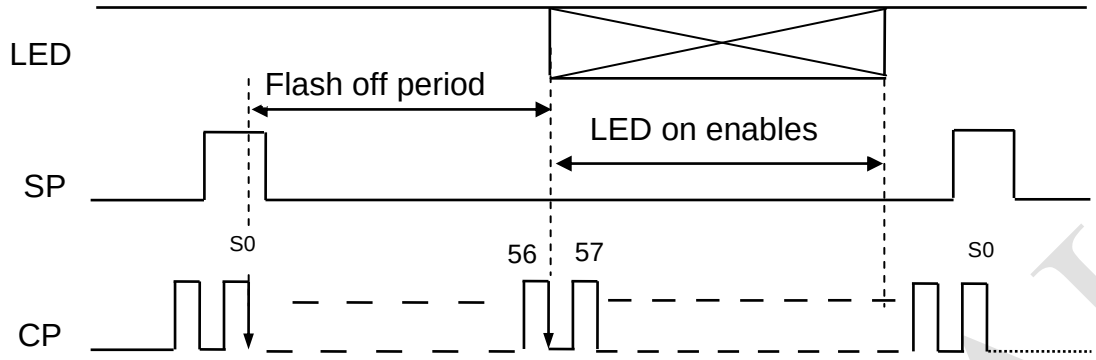


Figure9 LED Light Timing Diagram

Remarks:
1. LED should be turned on at 56th CP or later CP after the SP signal has been input.
2. LED should be turned off before the next SP input.

Timing Chart 4

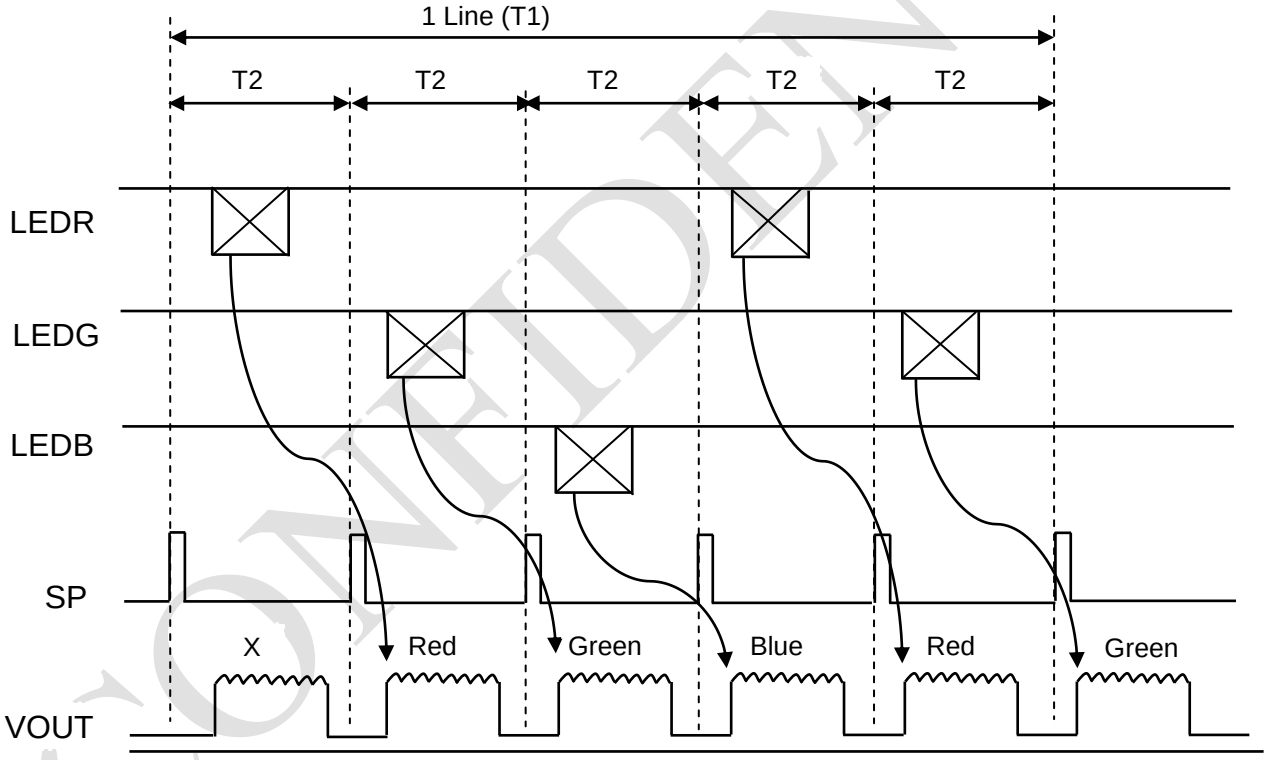
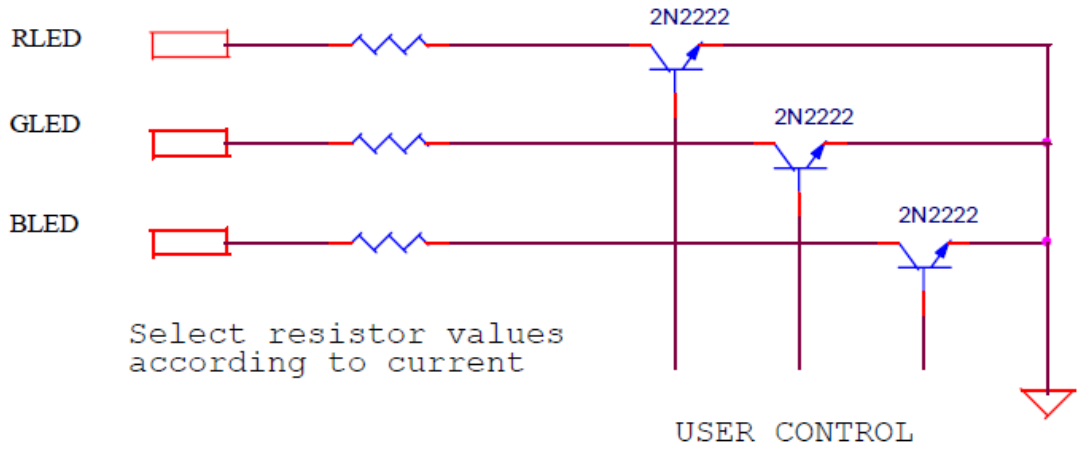


Figure10 LED Timing Chart in Color Mode

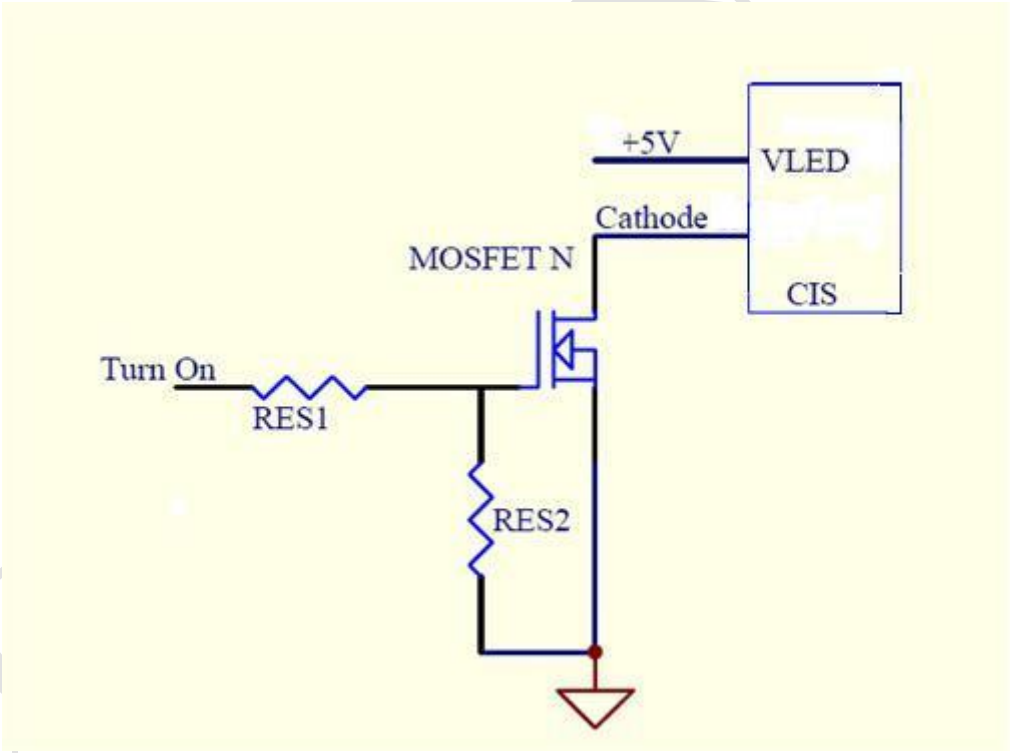
8. APPLICATION ADVICE

LED Control:

LED Sel-guide Light Source: Refer to the Table 5

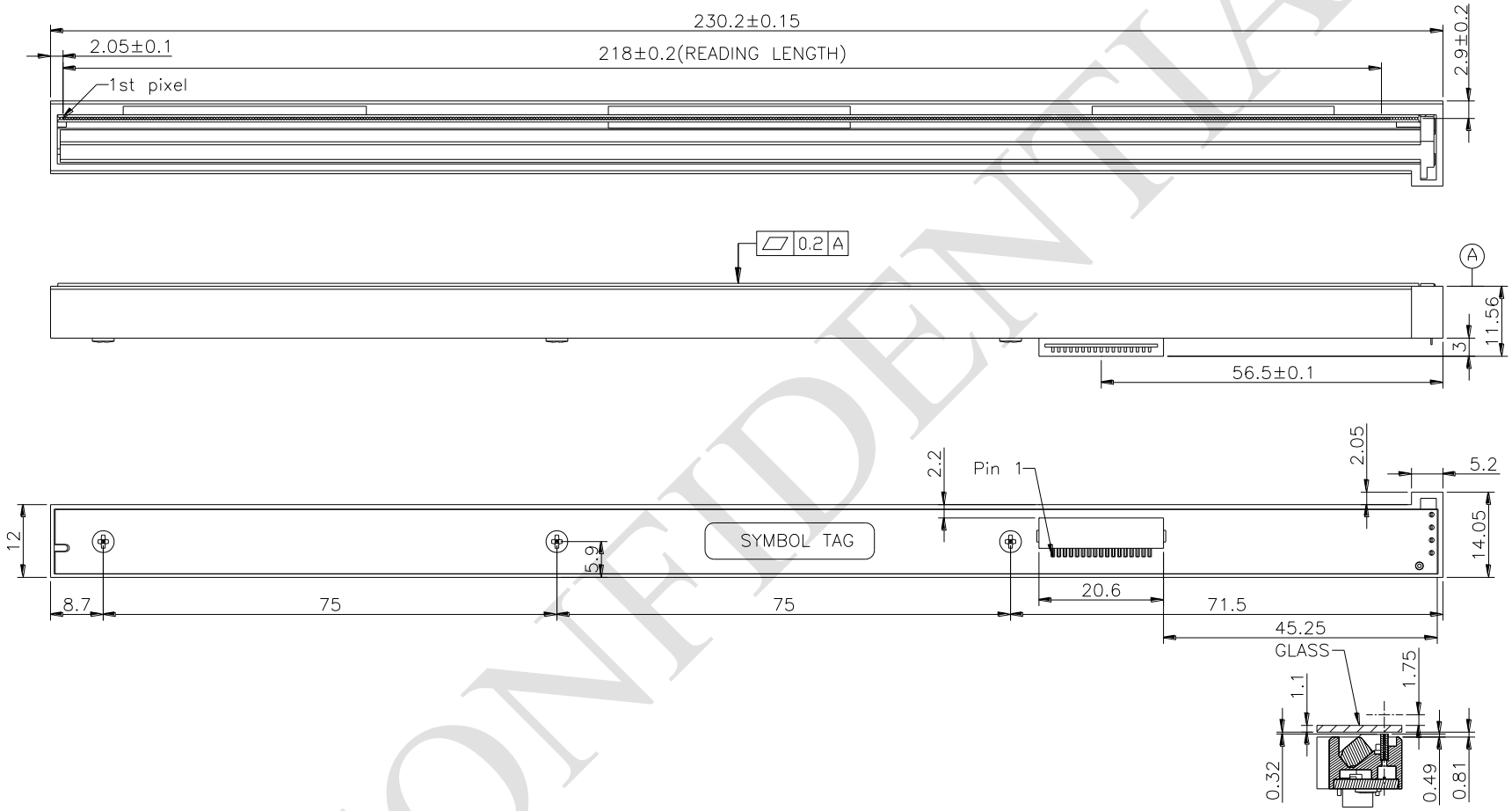


LED must be driven by pulse. This can be done simply with MOSFET N:



Adjusting the led array light on time in a line to get the desired output signal level, and it is recommended to add a variable resistor in led circuit to adjust the current of led light source in conveniently;

Attachment: the configuration and the physical dimensions (Unit: mm) of the H316A4C3.



CONNECTOR PIN

Pin No.	Symbol
1	VOUT1
2	GND
3	VOUT2
4	GND
5	VOUT3
6	GND
7	RS
8	VREF
9	GND
10	CP
11	VDD
12	SP
13	VLED
14	LEDB
15	LEDG
16	LEDR
17	GND