

DL515-01UHB-D PRODUCT SPECIFICATION

PRD

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REV.	MODIFICATION	DATE

LITE ON

LITE-ON SEMICONDUCTOR CORP.
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PRODUCT SPECIFICATION	敦南科技股份有限公司 LITE-ON SEMICONDUCTOR CORP.	INTERNAL DATA STRICTLY PRIVATE																		
<p>1. Purpose: To define the electrical characteristics, maximum rating, and operational conditions of the (600 / 300 DPI) RGB+IR Contact Image Sensor.</p> <p>2. Scope: DL515-01UHB-D, the 600 / 300 DPI A4 size RGB+IR Contact Image Sensor specifications.</p> <p>3. Specification:</p> <table border="1" data-bbox="248 943 1428 1877"> <tbody> <tr> <td data-bbox="248 943 691 1025">Readable Width</td> <td data-bbox="691 943 1428 1025">216 mm</td> </tr> <tr> <td data-bbox="248 1025 691 1126">Number of Sensor Elements</td> <td data-bbox="691 1025 1428 1126">1st ~ 5106th dots available, 5184 in total (600 DPI) 1st ~ 2553th dots available, 2592 in total (300 DPI)</td> </tr> <tr> <td data-bbox="248 1126 691 1198">Resolution</td> <td data-bbox="691 1126 1428 1198">600/300 DPI</td> </tr> <tr> <td data-bbox="248 1198 691 1350">Scanning Speed</td> <td data-bbox="691 1198 1428 1350">600DPI: 203us X 4 color 300DPI: 107us X 4 color</td> </tr> <tr> <td data-bbox="248 1350 691 1422">Clock Frequency</td> <td data-bbox="691 1350 1428 1422">10 MHz ,Max</td> </tr> <tr> <td data-bbox="248 1422 691 1621">Light Source</td> <td data-bbox="691 1422 1428 1621">Color LEDs: Red (630nm) Green (525nm) Blue (465nm) IR (850nm)</td> </tr> <tr> <td data-bbox="248 1621 691 1697">Data Output</td> <td data-bbox="691 1621 1428 1697">3 Analog Output</td> </tr> <tr> <td data-bbox="248 1697 691 1798">Chip Gap</td> <td data-bbox="691 1697 1428 1798">X-axis: 75 um max. Y-axis: 27 um max.</td> </tr> <tr> <td data-bbox="248 1798 691 1877">Outward Dimension (W*H*L)</td> <td data-bbox="691 1798 1428 1877">Attachment</td> </tr> </tbody> </table>			Readable Width	216 mm	Number of Sensor Elements	1 st ~ 5106 th dots available, 5184 in total (600 DPI) 1 st ~ 2553 th dots available, 2592 in total (300 DPI)	Resolution	600/300 DPI	Scanning Speed	600DPI: 203us X 4 color 300DPI: 107us X 4 color	Clock Frequency	10 MHz ,Max	Light Source	Color LEDs: Red (630nm) Green (525nm) Blue (465nm) IR (850nm)	Data Output	3 Analog Output	Chip Gap	X-axis: 75 um max. Y-axis: 27 um max.	Outward Dimension (W*H*L)	Attachment
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主題 : 600/300 DPI, A4 COLOR TITLE : CONTACT IMAGE SENSOR (CIS)	頁 SHEET 1 數 OF 14	10-5150-101UHB-D																		

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4. Pin Function Description:

No.	Signature	IN/OUT	Name	Description
1	SIG3	OUT	Signal Output	CIS Signal Output(9~12)
2	GND	IN	Ground	0V DC, Reference Point
3	SIG2	OUT	Signal Output	CIS Signal Output(5~8)
4	GND	IN	Ground	0V DC, Reference Point
5	SIG1	OUT	Signal Output	CIS Signal Output(1~4)
6	GND	IN	Ground	0V DC, Reference Point
7	VREF	OUT	Reference Level	VREF \pm 1.0V
8	GND	IN	Ground	0V DC, Reference Point
9	VDD	IN	Supply Voltage	Power supply, +3.3V
10	SI	IN	Start Pulse	CIS Start Pulse
11	GND	IN	Ground	0V DC, Reference Point
12	CLK	IN	Clock	CIS Main Clock
13	VLED	IN	LED Common	LED Current Supply Common (Anode)
14	LED_G	IN	LED Green Cathode	LED Power Supply Green
15	LED_R	IN	LED Red Cathode	LED Power Supply Red
16	LED_B	IN	LED B Cathode	LED Power Supply Blue
17	LED_IR	IN	LED IR Cathode	LED Power Supply IR
18	NC	-	No connection	

主題 : 600/300 DPI, A4 COLOR

TITLE : CONTACT IMAGE SENSOR (CIS)

頁 SHEET 2

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5. Electrical Characteristics: (@Ta=25°C)

Item	Symbol	MIN.	TYP.	MAX.	UNIT	NOTE
Power Supply	VDD	3.15	3.3	3.45	V	
	IDD	-	-	100	mA	
Input Voltage Level	VIH	2.4	-	VDD	V	CLK
	VIL	-	-	0.4	V	
Input Voltage Level	VIH	2.4	-	VDD	V	SI
	VIL	-	-	1.0	V	
LED Current	ILED (r)	-	45	50	mA	LED ON/OFF Max Duty=25%, See as Note 2
	ILED (g)	-	45	50	mA	
	ILED (b)	-	45	50	mA	
	ILED (ir)	-	45	50	mA	
DC Supply Voltage	VFred	1.7	2.1	2.4	V	Let IFred 20mA
		1.8	2.0	2.5		Let IFred =50mA
	VFgreen	2.8	3.1	3.6	V	Let IFgreen =20mA
		3.1	3.5	4.7		Let IFgreen =50mA
	VFblue	2.8	3.2	3.6	V	Let IFblue =20mA
		3.1	3.5	4.7		Let IFblue =50mA
	VFir	1.0	1.2	1.5	V	Let IFir =20mA
		1.2	1.5	1.7		Let IFir = 50mA

Note 3: LED's ON/OFF duty should be set at Max 25%.

主題 : 600/300 DPI, A4 COLOR	頁 SHEET 3	
TITLE : CONTACT IMAGE SENSOR (CIS)	數 OF 14	10-5150-101UHB-D

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6. Maximum Rating: (@ Ta=25°C)

ITEM	SYMBOL	MAXIMUM RATING	UNIT
Power Supply	VDD	3.6 V	V
Input Voltage (SI/CLK)	Vin	3.6 V	V
Storage Temperature	TSTG	-25~60	°C
Storage Humidity	HSTG	10~90	%RH
Operating Temperature	TOP	0~50	°C
Operating Humidity	HOP	10~90	%RH
LED Current (Red, Green, Blue,IR)	ILED	50 (Note3)	mA

Note3: Duty must lower than 25%.

7. Image-Data Output Characteristics: (@ Ta=25°C)

600 DPI : SI=203us * 4 Color, CLK= 10MHz, ILED= 45mA, (1st ~ 5106thdots)

ITEM	SYMBOL	SPECIFICATION	UNIT	NOTE
DC Supply	VDD	3.3±0.15	V	
SI, CLK Voltage	Vin	3.3±0.15	V	
Bright Output	VPH	300 (Min.)	mV	** Ref to Vd level
Bright Output Uniformity	Up	50 max.(TBD)	%	
Dark Output	Vd	VREF±0.2	V	LEDs OFF, Ref to GND
Reference Level Input	VREF	1.0±0.1	V	Clamp level definitions
VREF Input Pin of the Impedance		45	KΩ	
Dark Output Uniformity	Ud	150 max.	mV	
Modulation Transfer Function	MTF	40 min.	%	600DPI at 300 DPI pattern
Analog Output Saturation Voltage	Vosat	0.8min.	V	Ref to Vd
Image Lag Rate	RIL	3 max.	%	
	RIR	90 min.	%	
Gamma	γ	0.9 ~ 1.1		
Random noise	RN	5.0	mV	LEDs OFF

** Mean the measurement is base on bright output in the range of 300 ~ 450mV.

主題 : 600/300 DPI, A4 COLOR TITLE : CONTACT IMAGE SENSOR (CIS)	頁 SHEET 4 數 OF 14	10-5150-101UHB-D
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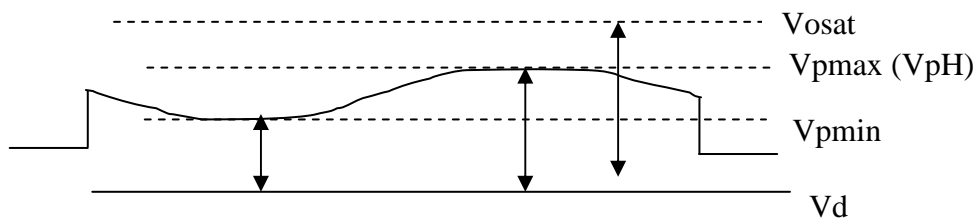
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8. Definition:

- (1) VpH level is defined as follows: (Refer to Vd level.)

$$V_{pH} = \text{Max} [VP(i)], i = 1 \sim 5106$$

Vp(i): the pixel output Measured White Paper Of O.D.=0.05~0.09



- (2) Bright Output Uniformity is defined as follows: (Refer to Vd level.)

$$U_p = \frac{VP(\text{max}) - VP(\text{min})}{VP(\text{max}) + VP(\text{min})} \times 100\%$$

VP(max): The Maximum Output Value Measured White Paper Of O.D.=0.05~0.09

VP(min): The Minimum Output Value Measured White Paper Of O.D.=0.05~0.09

- (3) Vd is defined as follows: (Refer to GND.)

Vd is the average output level in the dark.

- (4) Ud is defined as follows: (Refer to GND.)

$$U_d = V_d(\text{max}) - V_d(\text{min})$$

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(5) Modulation Transfer Function is defined as follows:

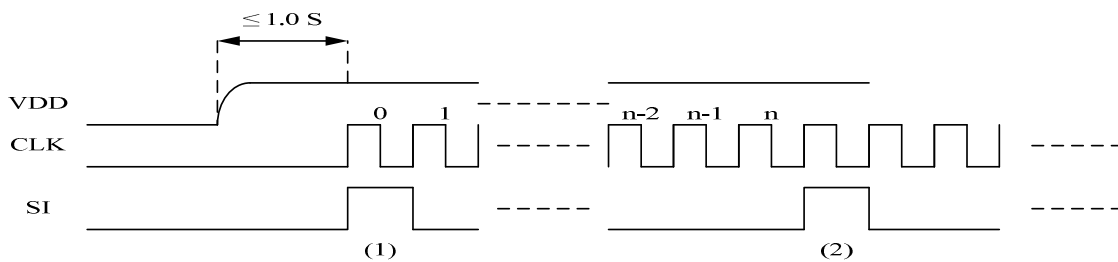
$$MTF = \frac{VSIG(max) - VSIG(min)}{VSIG(max) + VSIG(min)} \times 100\%$$

VSIG(max): The Maximum Output Value Measured at the surface of glass

VSIG(min): The Minimum Output Value Measured at the surface of glass

* 600 DPI at 300 DPI pattern

(6) Starting Power On Timing Chart



It must provide one cycle SI signal to reset at least when power start on.

(7) Gamma value is defined as follows:

$$\gamma(i) = \frac{\log[(V1 - Vd)/(V2 - Vd)]}{\log(t1/t2)}, \gamma = \gamma(i) / 5106, i = 1 \sim 5106$$

When The VpH=0.3V is 100% of the light intensity.

V1: Vp(i) of dynamic range when 90% of the light intensity (Reflection rate is t1).

i = 1~ 5106

V2: Vp(i) of dynamic range when 30% of the light intensity (Reflection rate is t2).

i = 1~ 5106

主題 : 600/300 DPI, A4 COLOR	頁 SHEET 6	
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(8) Image Lag is defined as follows:

RIL: Average of image lag ratios of all pixels; $RIL = (d-a)/(c-a)$

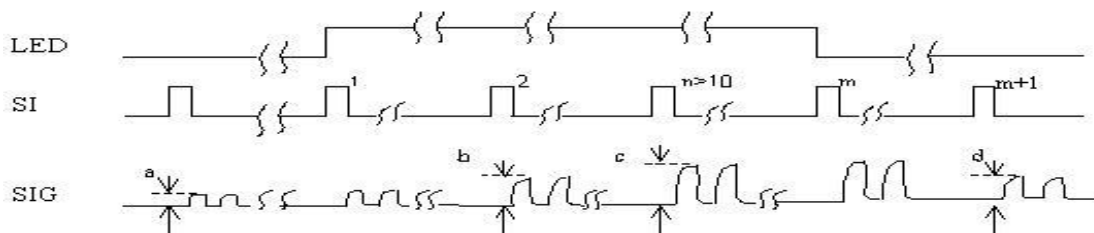
RIR: Average of light response ratios of all pixels; $RIR = (b-a)/(c-a)$

a: stable state dark signal.

b: unstable state(2nd SI) light signal when turning LED from off to on.

c: stable state light signal when turning LED from off to on.

d: unstable state(m+1th SI) dark signal when turning LED from on to off.



(9) Random noise is defined as follows:

$V_i(n)$ is each pixel dark output value and continue to record 30 line when LED OFF.

$$RN(n) = \sqrt{\frac{\sum_{i=1}^{30} (V_i(n) - \bar{V})^2}{(n-1)}} \quad , \quad \bar{V} = \frac{1}{30} \sum_{i=1}^{30} V_i(n)$$

$$RN = \frac{1}{5184} \sum_{i=1}^{5184} RN(n) \quad , \quad n = 1 \sim 5184$$

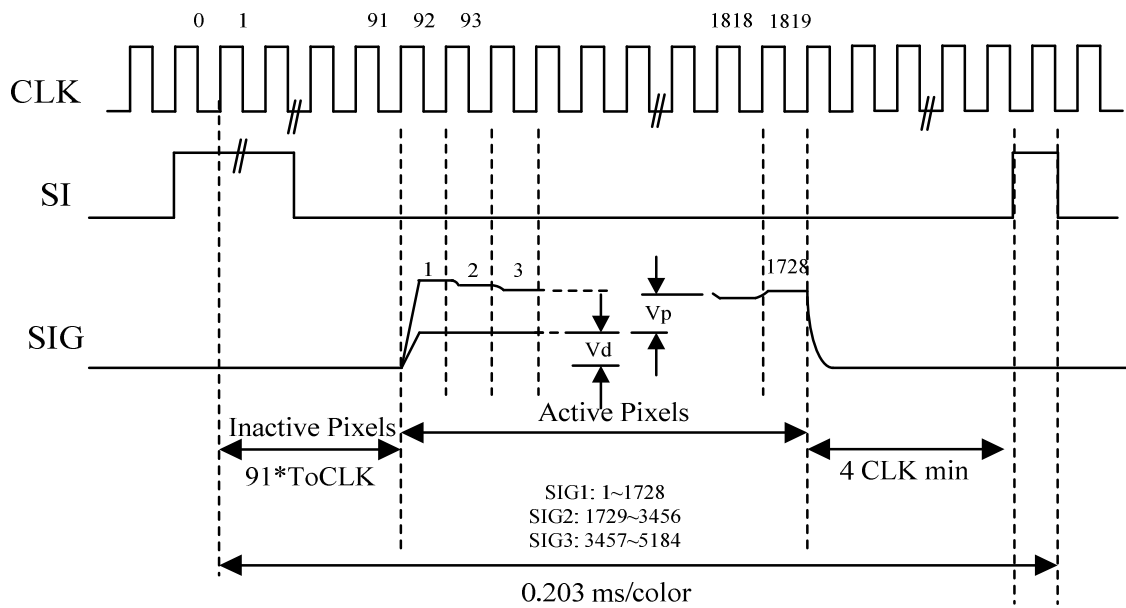
主題 : 600/300 DPI, A4 COLOR TITLE : CONTACT IMAGE SENSOR (CIS)	頁 SHEET 7 數 OF 14	10-5150-101UHB-D
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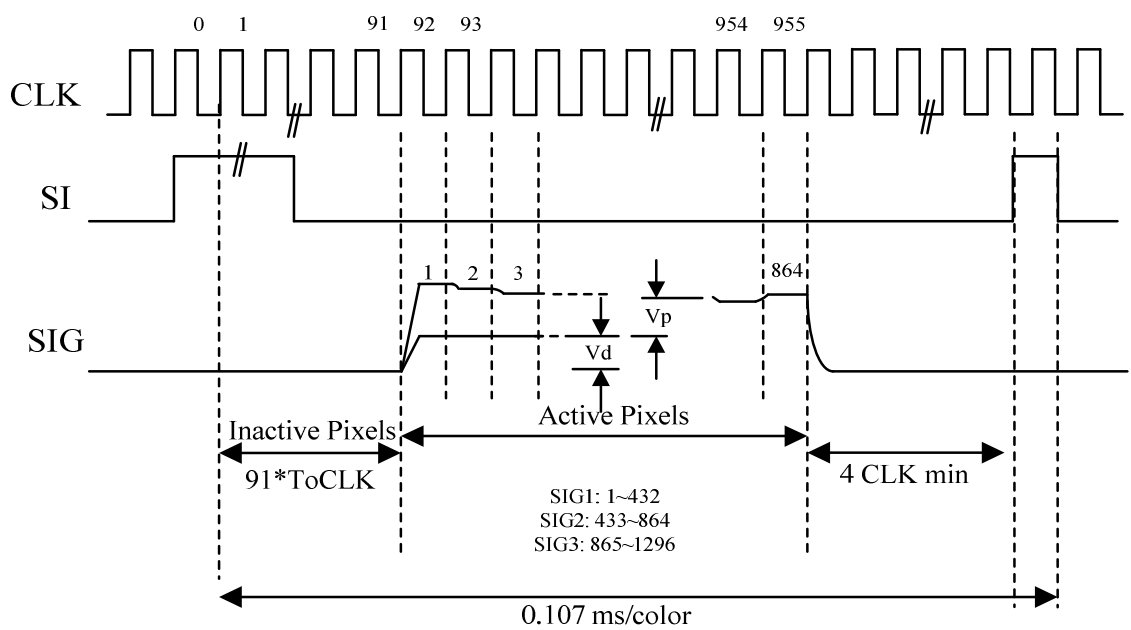
9. Timing:

Timing Chart I:

600DPI Timing Chart:



300DPI Timing Chart:

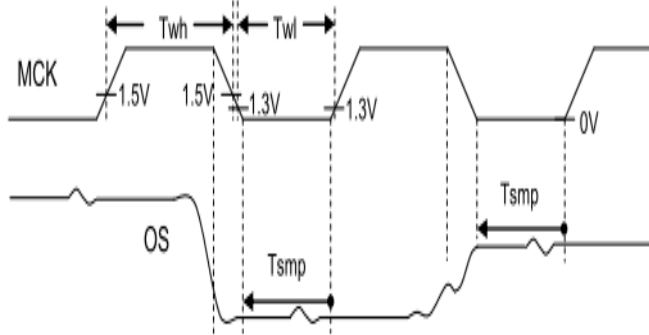


主題 : 600/300 DPI, A4 COLOR TITLE : CONTACT IMAGE SENSOR (CIS)	頁 SHEET 8 數 OF 14	10-5150-101UHB-D
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Timing Chart II:

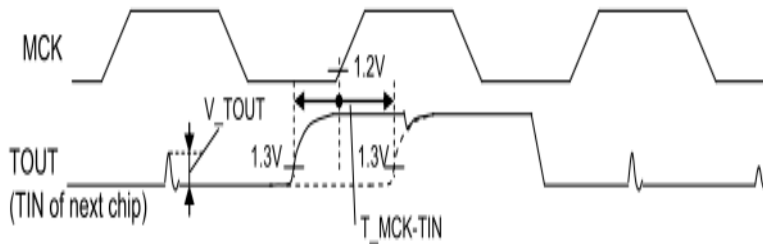
MCK-OS TIMING



Item	Symbol	MIN.	TYP.	MAX.	Unit
MCK pulse width	Twl	(45)	-	100	ns
	Twh	(45)	-	100	ns
Signal sampling	Tsmpl	(35)	40	Twh-10	ns

* In case MCK^L is stopped in a period except effective pixel period, Twl is permitted extra 1500ns(MAX).

MCK-TOUT TIMING (300dpi mode)

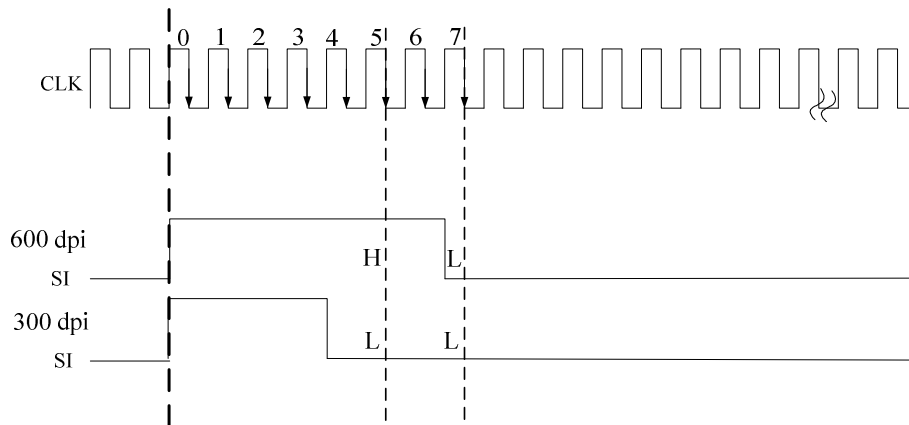


Item	Symbol	MIN.	TYP.	MAX.	Unit
TOUT noise	V _{TOUT}	-	0.5	1.3	V
MCK-TIN timing	T _{MCK-TIN}	-32	-	Twh-32	ns

Note 1:

Resolution Selection:

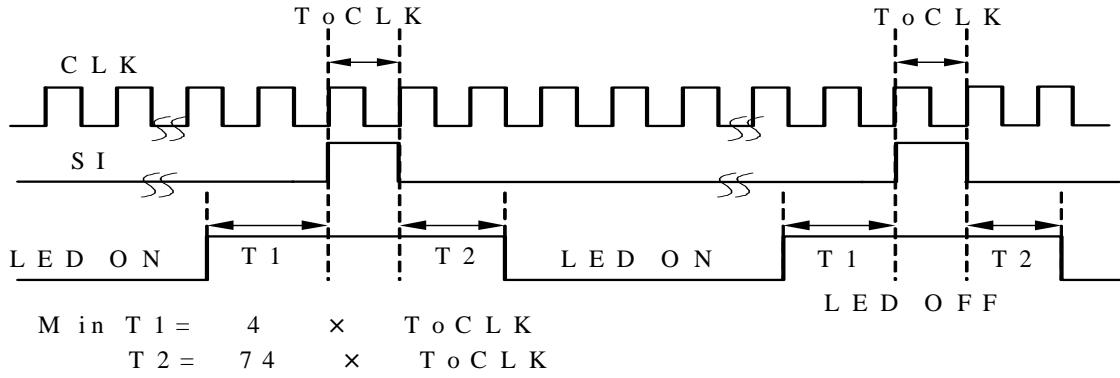
Mode	At 5th CLK raise edge	At 7th CLK raise edge	Pulse width
600dpi	H	L	/
300dpi	L	L	



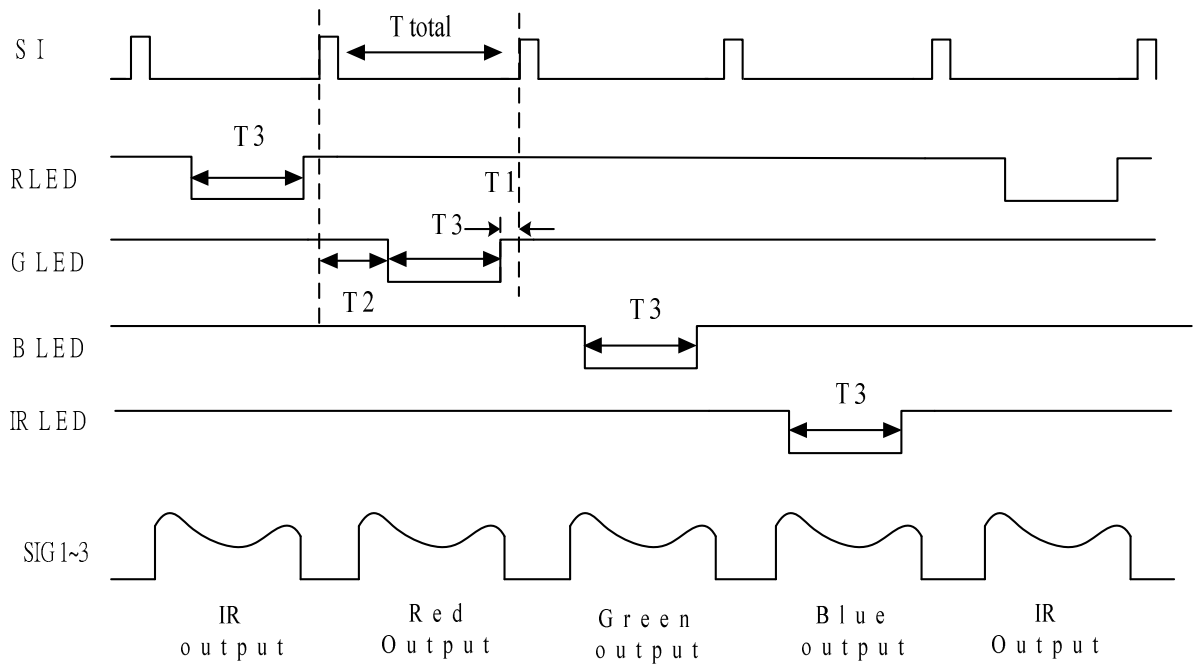
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Timing Chart III:

(1)

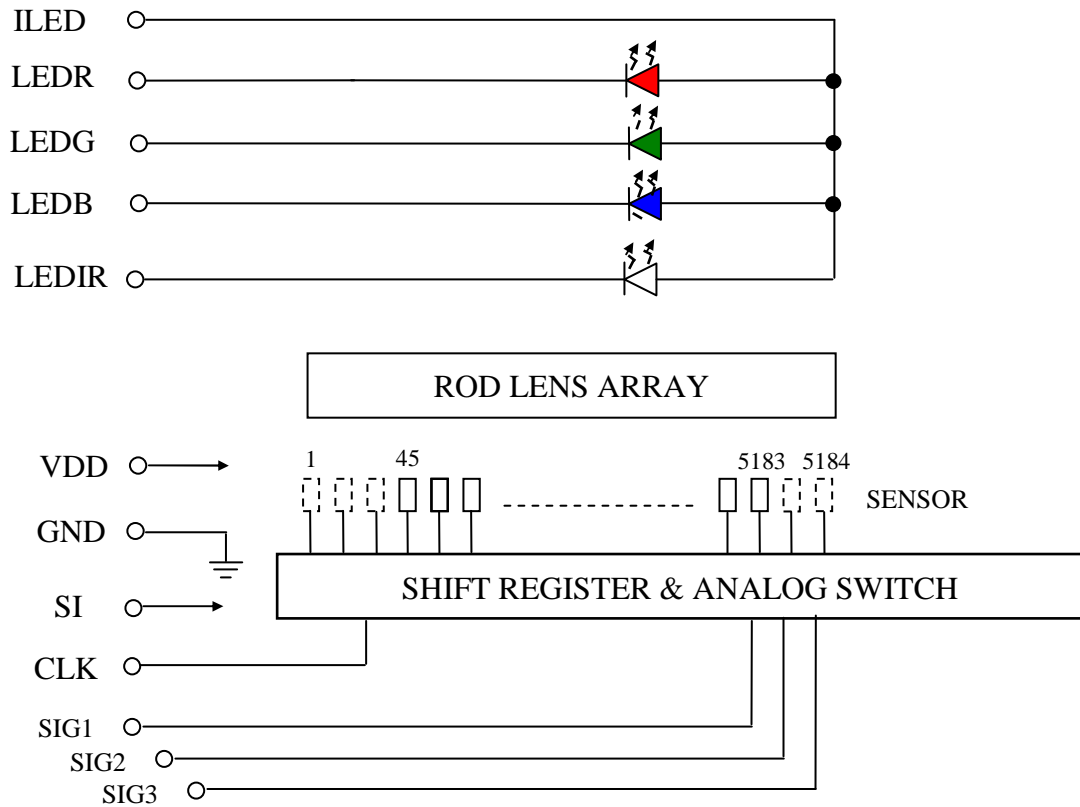


(2)



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10. CIS Block Diagram:

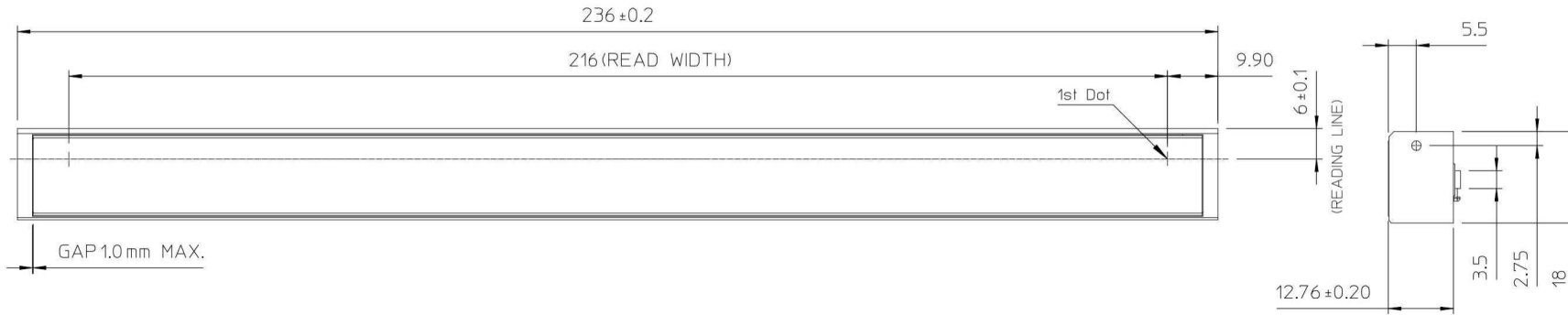


11. Operation Precautions:

- (1) The inactive pixel of video output which equal to $91 \times T_{oCLK}$ times after SI signal is not available.
- (2) Connector is connected directly to a substrate.
Don't add extra force to connectors when hands put in and out.
Don't take a CIS module by picking up connectors only.
- (3) Anti-electrostatic device have been designed into IC in order to keep IC away from electrostatic destroys.
Don't touch the connector pins by bare hands.
- (4) For maintain of VREF (pin7) in CIS module, connect an appropriate 47uF capacitor between VREF (pin7) and Analog GND.

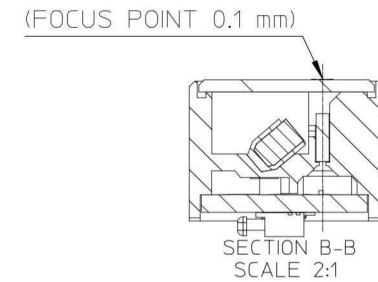
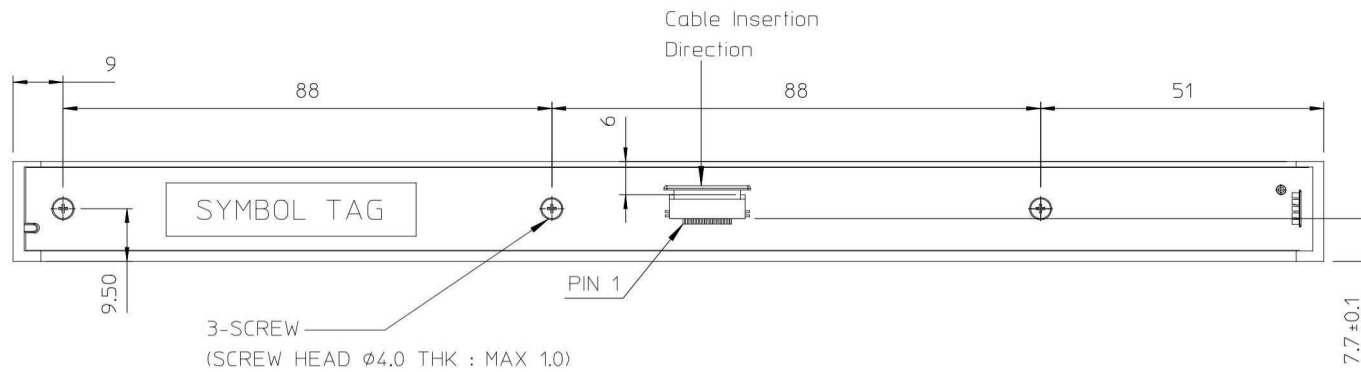
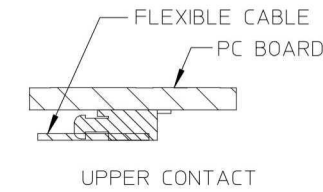
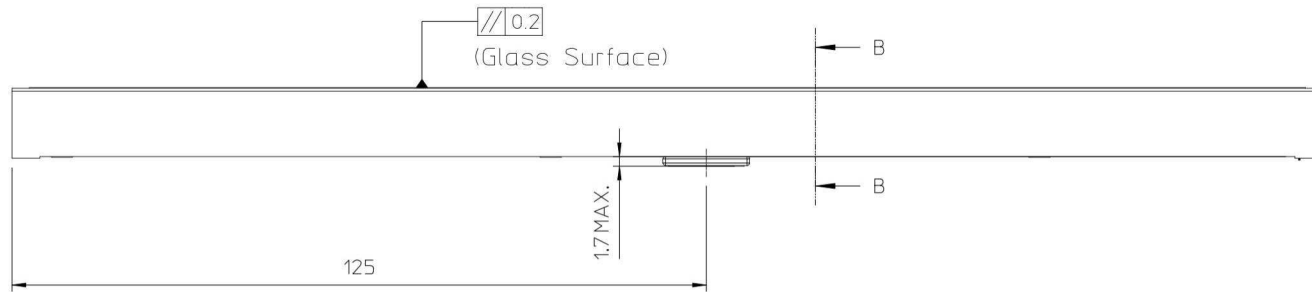
主題 : 600/300 DPI, A4 COLOR	頁 SHEET 11	
TITLE : CONTACT IMAGE SENSOR (CIS)	數 OF 14	10-5150-101UHB-D

SYM	REVISION



PIN ASSIGNMENT

PIN NO.	NAME
1	SIG3
2	GND
3	SIG2
4	GND
5	SIG1
6	GND
7	VREF
8	GND
9	VDD
10	SI
11	GND
12	CLK
13	VLED
14	LED_G
15	LED_R
16	LED_B
17	LED_IR
18	NC



MATERIAL:	DIMENSIONS		DRAFTSMAN	DATE	LITE-ON SEMICONDUCTOR CORPORATION	TITLE :	TOLERANCES UNLESS SPECIFIED						
	MILLIMETERS	INCHES					MILLIMETERS		INCHES				
PROCESSES:	SURFACE ROUGHNESS		CHECKER	DATE		.X	+0.250	.XXX	+0.025	.X	+0.010	.XXX	+0.001
	MICROMETERS	MICRONCHES	APPROVED	DATE		.XX	+0.100	.XXX	+0.005	.XX	+0.005	.XXX	+0.0002
						SCALE	B SIZE		SHEET				
SPEC. NO. 10-5150-101UHB-D						DL515-01UHB-D OUTLINE							