

Specification for Approval

PRODUCT NAME: RGS08096016WR000
PRODUCT NO.: 9918501000

CUSTOMER
APPROVED BY
DATE:

RITDISPLAY CORP. APPROVED

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
X01	INITIAL RELEASE	2007. 04. 11	
X02	<ul style="list-style-type: none"> ■ Add the operating conditions for different luminance ■ Modify D.C electrical characteristics ■ Add the panel electrical specifications ■ Add the application circuit 	2007. 05. 22	Page 6, 7, 8 & 14
X03	<ul style="list-style-type: none"> ■ Add polarizer 	2007. 06. 08	Page 4, 5, 6, 8, 15 & 16
X04	<ul style="list-style-type: none"> ■ Add handler 	2007. 07. 02	Page 16
X05	<ul style="list-style-type: none"> ■ Modify product name – RGC08096016WR000 → RGS08096016WR000 	2007. 07. 12	Page 1
X06	<ul style="list-style-type: none"> ■ Add the information of module weight ■ Modify D.C electrical characteristics ■ Add the specification of luminance uniformity ■ Modify FPC outline tolerance 	2007. 07. 27	Page 5, 7, 8, 16 & 20
X07	<ul style="list-style-type: none"> ■ Modify FPC outline tolerance 	2007. 08. 21	Page 16
A01	<ul style="list-style-type: none"> ■ Transfer from X version ■ Remove polarizer ■ Add the packing specification 	2007. 08. 31	Page 4, 5, 6, 8, 15, 16 & 17
A02	<ul style="list-style-type: none"> ■ Add polarizer 	2007. 10. 02	Page 4, 5, 6, 8, 15 & 16

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1. SCOPE

The purpose of this specification is to define the general provisions and quality requirements that apply to the supply of display cells manufactured by RiTdisplay. This document, together with the Module Ass'y Drawing, is the highest-level specification for this product. It describes the product, identifies supporting documents and contains specifications.

2. WARRANTY

RiTdisplay warrants that the products delivered pursuant to this specification (or order) will conform to the agreed specifications for twelve (12) months from the shipping date ("Warranty Period"). RiTdisplay is obligated to repair or replace the products which are found to be defective or inconsistent with the specifications during the Warranty Period without charge, on condition that the products are stored or used as the conditions specified in the specifications. Nevertheless, RiTdisplay is not obligated to repair or replace the products without charge if the defects or inconsistency are caused by the force majeure or the reckless behaviors of the customer.

After the Warranty Period, all repairs or replacements of the products are subject to charge.

3. FEATURES

- Small molecular organic light emitting diode.
- Color : White
- Panel matrix : 96*16
- Driver IC : SSD1305
- Excellent quick response time.
- Extremely thin thickness for best mechanism design : 1.41mm
- High contrast : 2000:1
- Wide viewing angle : 160°
- I²C Interface.
- Wide range of operating temperature : -40 to 70 °C
- **Anti-glare polarizer.**

4. MECHANICAL DATA

NO	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	96 (W) x 16 (H)	dot
2	Dot Size	0.185 (W) x 0.185 (H)	mm ²
3	Dot Pitch	0.205 (W) x 0.205 (H)	mm ²
4	Aperture Rate	81	%
5	Active Area	19.66 (W) x 3.26 (H)	mm ²
6	Panel Size	29 (W) x 9.2 (H)	mm ²
7	Panel Thickness	1.41 ± 0.1	mm
8	Module Size	35 (W) x 9.2 (H) x 1.41 (D)	mm ³
9	Diagonal A/A size	0.8	inch
10	Module Weight	0.75 ± 10%	gram

5. MAXIMUM RATINGS

ITEM	MIN	MAX	UNIT	Condition	Remark
Supply Voltage (V_{DD})	-0.3	3.5	V	$T_a = 25^\circ\text{C}$	IC maximum rating
Supply Voltage (V_{CC})	8	16	V	$T_a = 25^\circ\text{C}$	IC maximum rating
Operating Temp.	-40	70	$^\circ\text{C}$		
Storage Temp	-40	85	$^\circ\text{C}$		
Humidity	-	85	%		
Life Time	21,000	-	Hrs	140 cd/m^2 , 50% checkerboard	Note (1)
Life Time	25,000	-	Hrs	120 cd/m^2 , 50% checkerboard	Note (2)
Life Time	30,000	-	Hrs	100 cd/m^2 , 50% checkerboard	Note (3)

Note:

(A) Under $V_{CC} = 10\text{V}$, $T_a = 25^\circ\text{C}$, 50% RH.

(B) Life time is defined the amount of time when the luminance has decayed to less than 50% of the initial measured luminance.

(1) Setting of 140 cd/m^2 :

- Contrast setting : 0x26H
- Frame rate : 105Hz
- Duty setting : 1/16

(2) Setting of 120 cd/m^2 :

- Contrast setting : 0x20H
- Frame rate : 105Hz
- Duty setting : 1/16

(3) Setting of 100 cd/m^2 :

- Contrast setting : 0x1BH
- Frame rate : 105Hz
- Duty setting : 1/16

6. ELECTRICAL CHARACTERISTICS

6.1 D.C ELECTRICAL CHARACTERISTICS

($V_{SS}=0V$, $V_{DD}=2.4$ to $3.5V$, $T_a=25^{\circ}C$)

SYMBOL	PARAMETERS	TEST CONDITION	MIN	TYP	MAX	UNIT
V_{CC}	Analog power supply (for OLED panel)		9.5	10	10.5	V
V_{DD}	Digital power supply		2.4	2.7	3.5	V
V_{DDIO}	Logic Supply Voltage for MCU interface		1.6	1.8	V_{DD}	
I_{DD}	Operating current for V_{DD} $V_{DD} = 2.7V$, $V_{CC} = 12V$, $I_{REF} = 10\mu A$, No panel attached, All Display ON	Contrast=FF	-	100	-	μA
I_{CC}	Operating current for V_{CC} $V_{DD} = 2.7V$, $V_{CC} = 12V$, $I_{REF} = 10\mu A$, No panel attached, All Display ON	Contrast=FF	-	550	-	μA
V_{IH}	Hi logic input level		0.8* V_{DDIO}	-	V_{DDIO}	V
V_{IL}	Low logic input level		0	-	0.2* V_{DDIO}	V
V_{OH}	Hi logic output level		0.9* V_{DDIO}	-	V_{DDIO}	V
V_{OL}	Low logic output level		0	-	0.1* V_{DDIO}	V
I_{SEG}	Segment on output current $V_{DD}=2.7V$, $V_{CC}=12V$, $I_{REF}=10\mu A$, Display on, Segment pin under test is connected with a 20K resistive load to V_{SS}	Contrast=FF	294	320	346	μA
		Contrast=AF	-	220	-	μA
		Contrast=7F	-	159	-	μA
		Contrast=3F	-	79	-	μA
		Contrast=0F	-	19	-	μA

Note : The V_{CC} input must keep in a stable value; ripple and noise are not allowed.

6.2 ELECTRO-OPTICAL CHARACTERISTICS

PANEL ELECTRICAL SPECIFICATIONS

PARAMETER	MIN	TYP.	MAX	UNITS	COMMENTS
Normal mode current		2	4	mA	All pixels on (1)
Standby mode current		0.2	0.4	mA	Standby mode 10% pixels on (2)
Normal mode power consumption		20	40	mW	All pixels on (1)
Standby mode power consumption		2	4	mW	Standby mode 10% pixels on (2)
Normal Luminance	100	120		cd/m ²	Display Average
Standby Luminance		10		cd/m ²	Display Average
CIE _x (White)	0.24	0.28	0.32		x, y (CIE 1931)
CIE _y (White)	0.28	0.32	0.36		
Dark Room Contrast	2000:1				
Viewing Angle	160			degree	
Response Time		10		μs	
Luminance Uniformity			10	%	

(1) Normal mode condition :

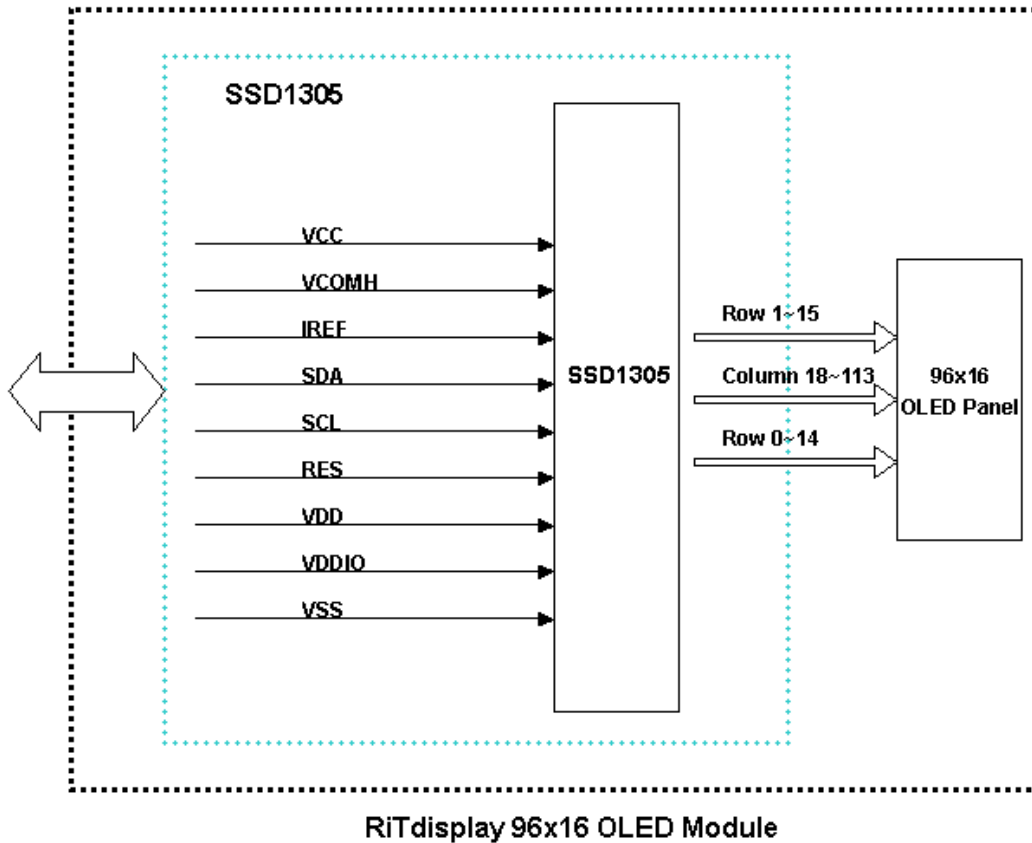
- Driving Voltage : 10V
- Contrast setting : 0x20H
- Frame rate : 105Hz
- Duty setting : 1/16

(2) Standby mode condition :

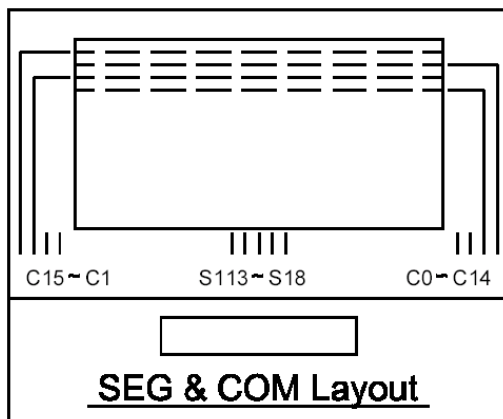
- Driving Voltage : 10V
- Contrast setting : 0x00H
- Frame rate : 105Hz
- Duty setting : 1/16

7. INTERFACE

7.1 FUNCTION BLOCK DIAGRAM



7.2 PANEL LAYOUT DIAGRAM



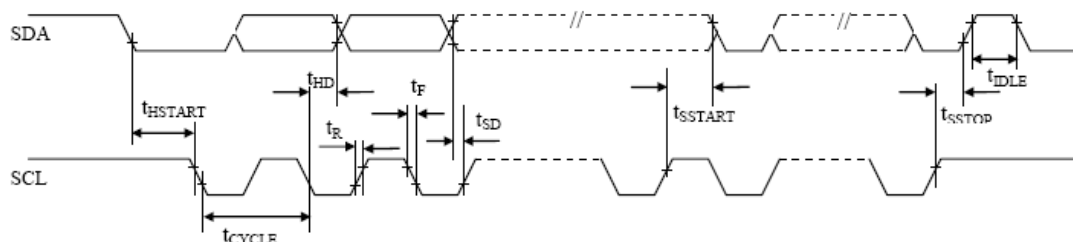
7.3 PIN ASSIGNMENTS

Pin No.	Pin Name	Description
1	VCC	Positive OLED high voltage power supply
2	VCOMH	The COM voltage reference pin, this pin should be connected to ground through a capacitor.
3	IREF	The current reference input pin, this pin should be connected to ground through a resistor.
4	SDA(D2,D1)	I ² C serial data pin
5	SCL(D0)	I ² C serial clock pin
6	RES	Hardware reset signal
7	VDDIO	This pin is a power supply pin of I/O buffer.
8	VDD	Power supply for logic circuit
9	VSS	This is a ground pin.
10	NC	No connection.

7.5 INTERFACE TIMING CHART

I2C Interface Timing Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	2.5	-	-	us
t_{HSTART}	Start condition Hold Time	0.6	-	-	us
t_{HD}	Data Hold Time (for "SDA _{OUT} " pin)	0	-	-	ns
	Data Hold Time (for "SDA _{IN} " pin)	300	-	-	ns
t_{SD}	Data Setup Time	100	-	-	ns
t_{SSTART}	Start condition Setup Time (Only relevant for a repeated Start condition)	0.6	-	-	us
t_{SSTOP}	Stop condition Setup Time	0.6	-	-	us
t_{R}	Rise Time for data and clock pin	-	-	300	ns
t_{F}	Fall Time for data and clock pin	-	-	300	ns
t_{IDLE}	Idle Time before a new transmission can start	1.3	-	-	us

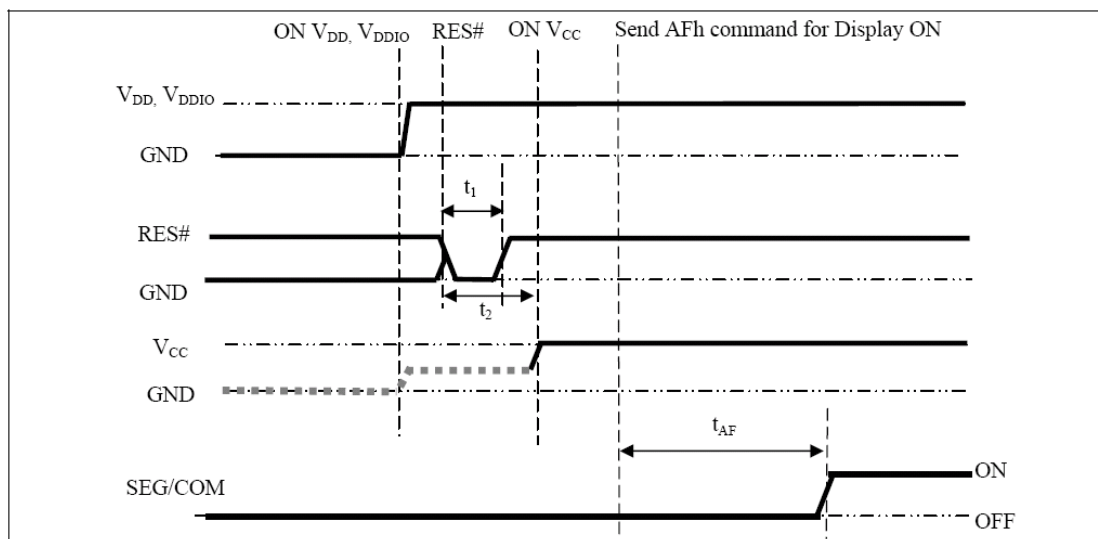


8. POWER ON / OFF SEQUENCE & APPLICATION CIRCUIT

8.1 POWER ON / OFF SEQUENCE

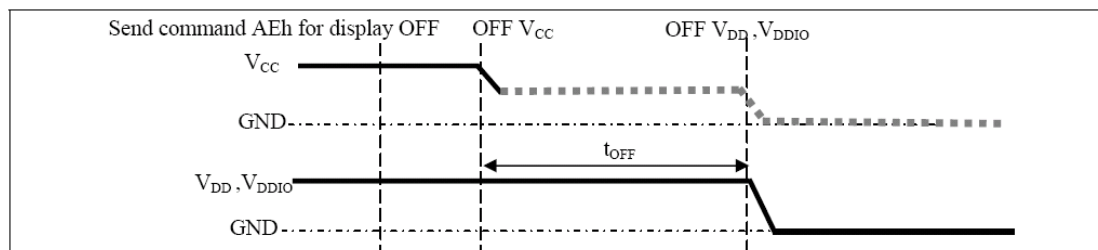
Power ON sequence:

1. Power ON V_{DD} , V_{DDIO} .
2. After V_{DD} , V_{DDIO} become stable, set RES# pin LOW (logic low) for at least $3\mu s(t_1)$ and then HIGH (logic high).
3. After set RES# pin LOW (logic low), wait for at least $3\mu s(t_2)$. Then Power ON V_{CC} .(1)
4. After V_{CC} become stable, send command AFh for display ON. SEG/COM will be ON after $100ms(t_{AF})$.



Power OFF sequence:

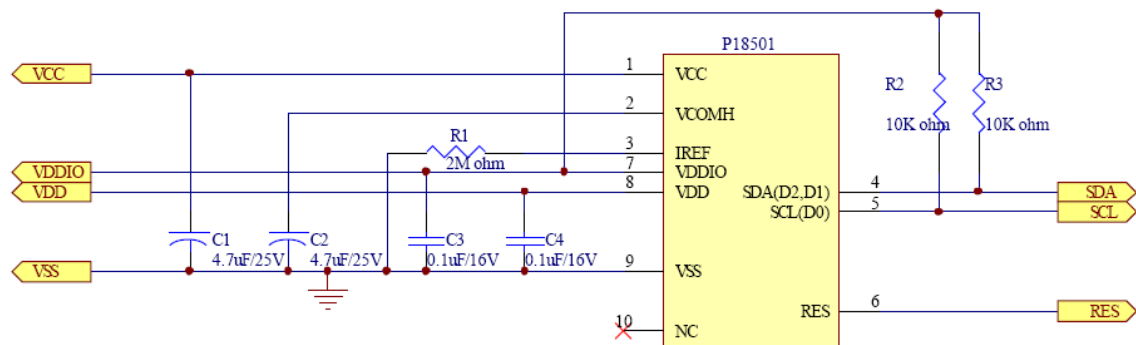
1. Send command AEh for display OFF.
2. Power OFF V_{CC} . (1), (2)
3. Wait for t_{OFF} . Power OFF V_{DD} , V_{DDIO} . (where Minimum $t_{OFF}=0ms$, Typical $t_{OFF}=100ms$)



Note:

- (1) Since an ESD protection circuit is connected between V_{DD} , V_{DDIO} and V_{CC} , V_{CC} becomes lower than V_{DD} whenever V_{DD} , V_{DDIO} is ON and V_{CC} is OFF as shown in the dotted line of V_{CC} in above figures.
- (2) V_{CC} should be disabled when it is OFF.

8.2 APPLICATION CIRCUIT



Component:

C1, C2: 4.7uF/25V (Tantalum type)

C3, C4: 0.1uF/16V(0603)

R1: 2M ohm(0603)

R2, R3: 10K ohm(0603)

This circuit is for I²C interface.

8.3 COMMAND TABLE

Refer to SSD1305 IC Spec.

9. RELIABILITY TEST CONDITIONS

No.	Items	Specification	Quantity
1	High temp. (Non-operation)	85°C, 240hrs	5
2	High temp. (Operation)	70°C, 120hrs	5
3	Low temp. (Operation)	-40°C, 120hrs	5
4	High temp. / High humidity (Operation)	65°C, 90%RH, 120hrs	5
5	Thermal shock (Non-operation)	-40°C ~85°C (-40°C /30min; transit /3min; 85°C /30min; transit /3min) 1cycle: 66min, 100 cycles	5
6	Vibration	Frequency : 5~50HZ, 0.5G Scan rate : 1 oct/min Time : 2 hrs/axis Test axis : X, Y, Z	1 Carton
7	Drop	Height: 120cm Sequence : 1 angle 、 3 edges and 6 faces Cycles: 1	1 Carton
8	ESD (Non-operation)	Air discharge model, ±8kV, 10 times	5

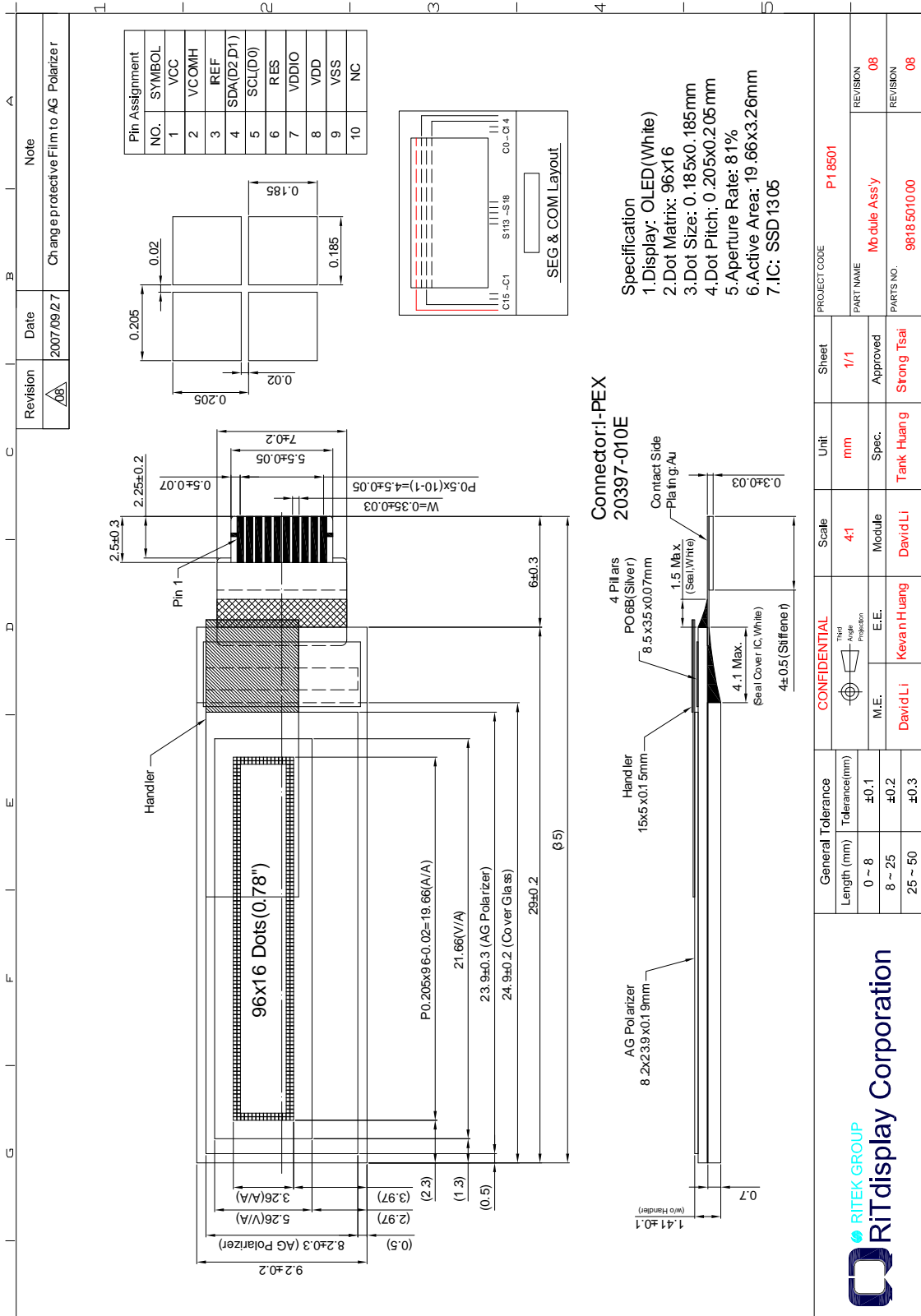
Test and measurement conditions

- All measurements shall not be started until the specimens attain to temperature stability.
- All-pixels-on is used as operation test pattern.
- The degradation of Polarizer are ignored for item 1, 4 & 5.

Evaluation criteria

- The function test is OK.
- No observable defects.
- Luminance: > 50% of initial value.
- Current consumption: within ± 50% of initial value.

10. EXTERNAL DIMENSION



11. PACKING SPECIFICATION

	Revision	Date	Note
A1	20/07/08/08	Packing Tray Instruction	

① P18501 Module
 PN:9818501000
 旋轉放置

② Packing Tray
 PN:3008000101
 330x270x8.7mm, t=0.7mm

③ 5G 矽膠乾膜
 PN:3010000002
 x4

④ 真空包裝袋 ONY LDPE
 P/N:3003000012
 480x285x9.0mm
 抽真空4秒

⑤ Antistatic Bubble Bag
 PN:3003000013
 420x(35.0+4.50)mm

⑥ Pizza Box
 P/N:3001000005
 345x285x88, B 頁

⑦ 藍色 Carton
 P/N:3000000009
 385x305x203mm

⑧ Label
 P/N:3006000000
 x2 pcs

⑨ 封箱膠帶
 P/N:3208000125

⑩ 封箱膠帶
 P/N:3208000125

⑪ 旋轉掛置

⑫ 旋轉掛置

⑬ 旋轉掛置

⑭ 旋轉掛置

⑮ 旋轉掛置

⑯ 旋轉掛置

⑰ 旋轉掛置

⑱ 旋轉掛置

⑲ 旋轉掛置

⑳ 旋轉掛置

㉑ 旋轉掛置

㉒ 旋轉掛置

㉓ 旋轉掛置

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Item	Part No.	Description	QTY
1	9818501000	P18501 Module Assy	4000
2	3008000101	Tray 330x270x8.7mm, t=0.7mm	42
3	3010000002	5G 矽膠乾膜	8
4	3003000012	真空包裝袋 480x285x9.0mm	2
5	3003000013	Antistatic Bubble Bag 420x(35.0+4.50)mm	2
6	3001000005	Pizza Box 345x285x88, B 頁	2
7	3000000009	藍色 Carton, 385x305x203mm	1
8	3006000000	Label	3
9	3208000125	封箱膠帶	

CONFIDENTIAL		PROJECT CODE	P-18501
General Tolerance	Scale	Sheet	Revision
Length (mm)	1:9	1/1	01
0 ~ 8	Module	Approved	Packing Tray Instruction
±0.1	M.E.	Spec.	PARTS NO.
8 ~ 25	E.E.	Tan k Wang	99 185 01000
±0.2	Kevan Huang	David Li	REVISION
25 ~ 50	David Li	Stong Tsai	01
±0.3	The Auto Projection	Stong Tsai	REVISION
0 ~ 8	The Auto Projection	Stong Tsai	01

12. APPENDIXES

APPENDIX 1: DEFINITIONS

A. DEFINITION OF CHROMATICITY COORDINATE

The chromaticity coordinate is defined as the coordinate value on the CIE 1931 color chart for R, G, B, W.

B. DEFINITION OF CONTRAST RATIO

The contrast ratio is defined as the following formula:

$$\text{Contrast Ratio} = \frac{\text{Luminance of all pixels on measurement}}{\text{Luminance of all pixels off measurement}}$$

C. DEFINITION OF RESPONSE TIME

The definition of turn-on response time T_r is the time interval between a pixel reaching 10% of steady state luminance and 90% of steady state luminance. The definition of turn-off response time T_f is the time interval between a pixel reaching 90% of steady state luminance and 10% of steady state luminance. It is shown in Figure 2.

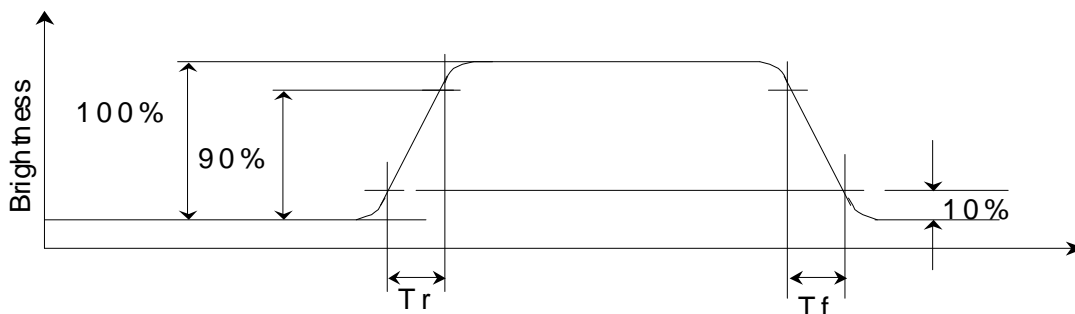


Figure 2: Response time

D. DEFINITION OF VIEWING ANGLE

The viewing angle is defined as Figure 3. Horizontal and vertical (H & V) angles are determined for viewing directions where luminance varies by 50% of the perpendicular value.

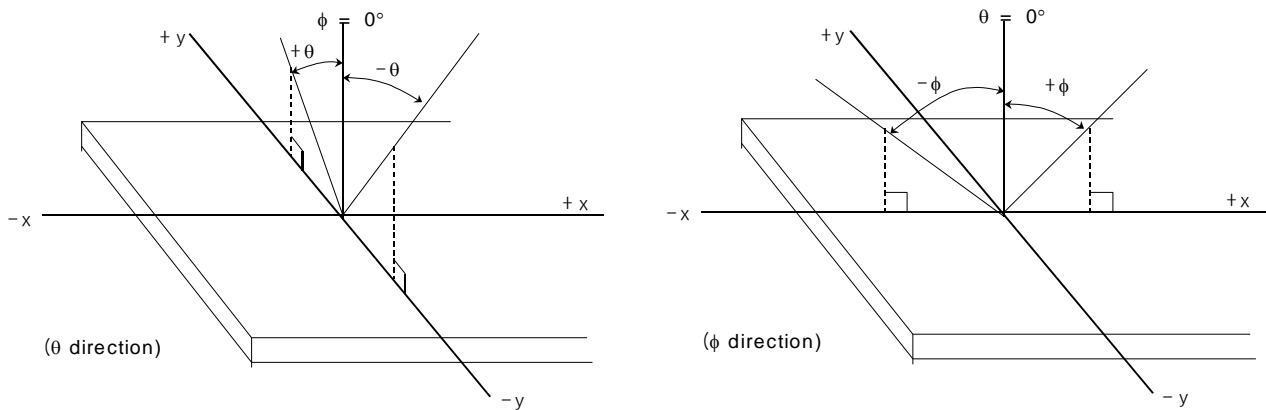


Figure 3: Viewing Angle

E. DEFINITION OF LUMINANCE UNIFORMITY

Luminance uniformity is measured as the relative deviation of brightness across the panel in 5 regions.

$$LU = (L_{max} - L_{min}) / L_{max} * 100\%$$

L_{max} : indicates the maximum luminance of the 5 points

L_{min} : indicates the minimum luminance of the 5 points

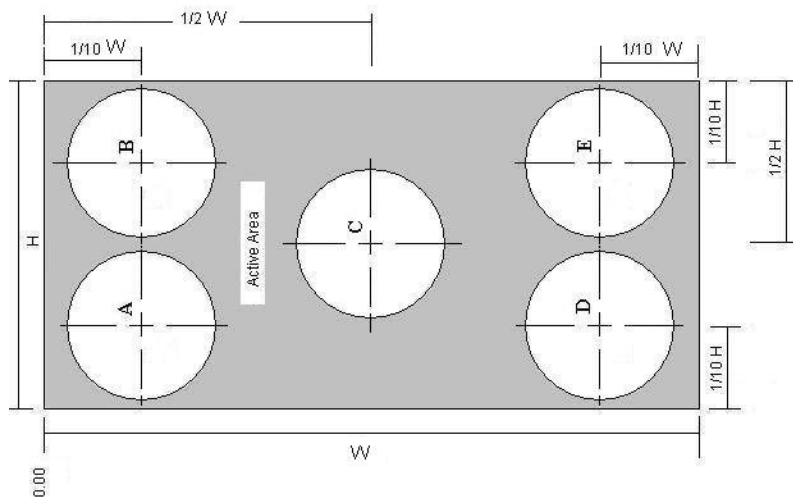
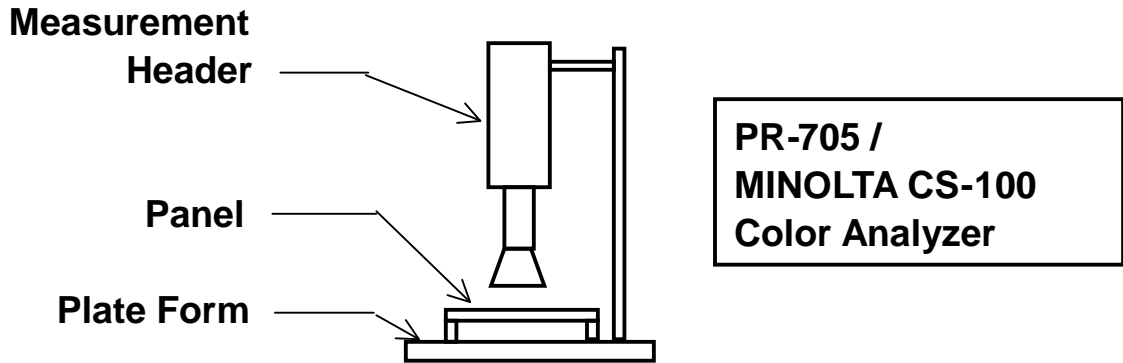


Figure 4: Define the measurement points for luminance uniformity

APPENDIX 2: MEASUREMENT APPARATUS

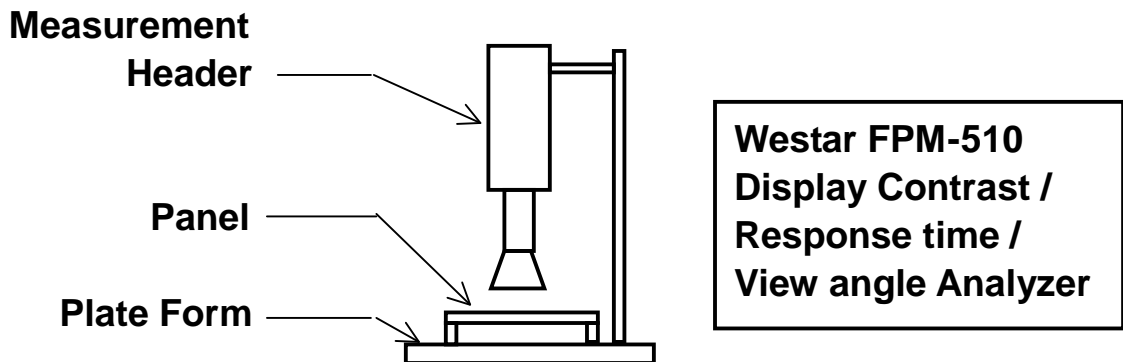
A. LUMINANCE/COLOR COORDINATE

PHOTO RESEARCH PR-705, MINOLTA CS-100

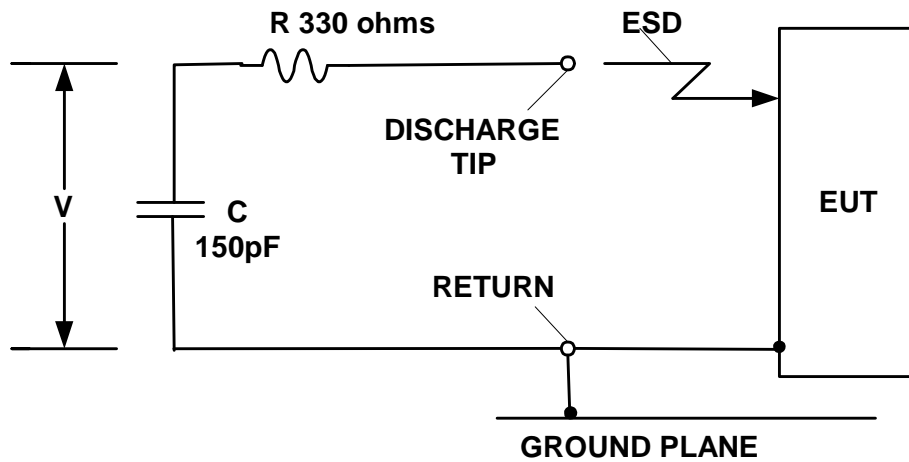


B. CONTRAST / RESPONSE TIME / VIEW ANGLE

WESTAR CORPORATION FPM-510



C. ESD ON AIR DISCHARGE MODE



APPENDIX 3: PRECAUTIONS

A. RESIDUE IMAGE

Because the pixels are lighted in different time, the luminance of active pixels may reduce or differ from inactive pixels. Therefore, the residue image will occur. To avoid the residue image, every pixel needs to be lighted up uniformly.