

Specification for Approval

PRODUCT NAME: RGC10128032WR003
PRODUCT NO.: 9917504000
PART NUMBER: PMO17504

CUSTOMER
APPROVED BY
DATE:

PACER INTERNATIONAL LTD. APPROVED

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
X01	INITIAL RELEASE	2007. 07. 06	
X02	■ Add the operating conditions for different luminance ■ Add the panel electrical specifications	2007. 07. 27	Page 6, 7 & 8
A01	■ Transfer from X version ■ Add the information of module weight ■ Add the packing specification	2007. 08. 01	Page 5 & 17
A02	■ Modify power off sequence ■ Modify description of connector	2008. 03. 06	Page 13 & 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 : 128*32
- Driver IC : SSD1305
- Excellent quick response time.
- Extremely thin thickness for best mechanism design : 1.61mm
- High contrast : 2000:1
- Wide viewing angle : 160°
- Serial Peripheral Interface.
- Wide range of operating temperature : -40 to 70 °C
- Anti-glare polarizer.

4. MECHANICAL DATA

NO	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	128 (W) x 32 (H)	dot
2	Dot Size	0.18 (W) x 0.18 (H)	mm ²
3	Dot Pitch	0.20 (W) x 0.20 (H)	mm ²
4	Aperture Rate	81	%
5	Active Area	25.58 (W) x 6.38 (H)	mm ²
6	Panel Size	30.4 (W) x 14.5 (H)	mm ²
7	Panel Thickness	1.61 ± 0.1	mm
8	Module Size	30.4 (W) x 29 (H) x 1.61 (D)	mm ³
9	Diagonal A/A size	1.0	inch
10	Module Weight	1.41 ± 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	140cd/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/m² :

- Contrast setting : 0x41
- Frame rate : 105Hz
- Duty setting : 1/32

(2) Setting of 120 cd/m² :

- Contrast setting : 0x38
- Frame rate : 105Hz
- Duty setting : 1/32

(3) Setting of 100 cd/m² :

- Contrast setting : 0x2A
- Frame rate : 105Hz
- Duty setting : 1/32

6. ELECTRICAL CHARACTERISTICS

6.1 D.C ELECTRICAL CHARACTERISTICS

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

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}	Power supply for I/O pins		1.6	-	V_{DD}	V
I_{DD}	Operating current for V_{DD} $V_{DD} = 2.7V$, $V_{CC} = 12V$, $I_{REF} = 10\mu A$ No loading, 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 loading, 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 1: $V_{DD}= 2.7V$; $V_{CC}= 10V$; Frame rate= 105Hz ; No panel attached.

Note 2: 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		5	6	MA	All pixels on (1)
Standby mode current		0.5	1	MA	Standby mode 10% pixels on (2)
Normal mode power consumption		50	60	mW	All pixels on (1)
Standby mode power consumption		5	10	mW	Standby mode 10% pixels on (2)
Normal Luminance	100	120		cd/m ²	Display Average
Standby Luminance		20		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	

(1) Normal mode condition :

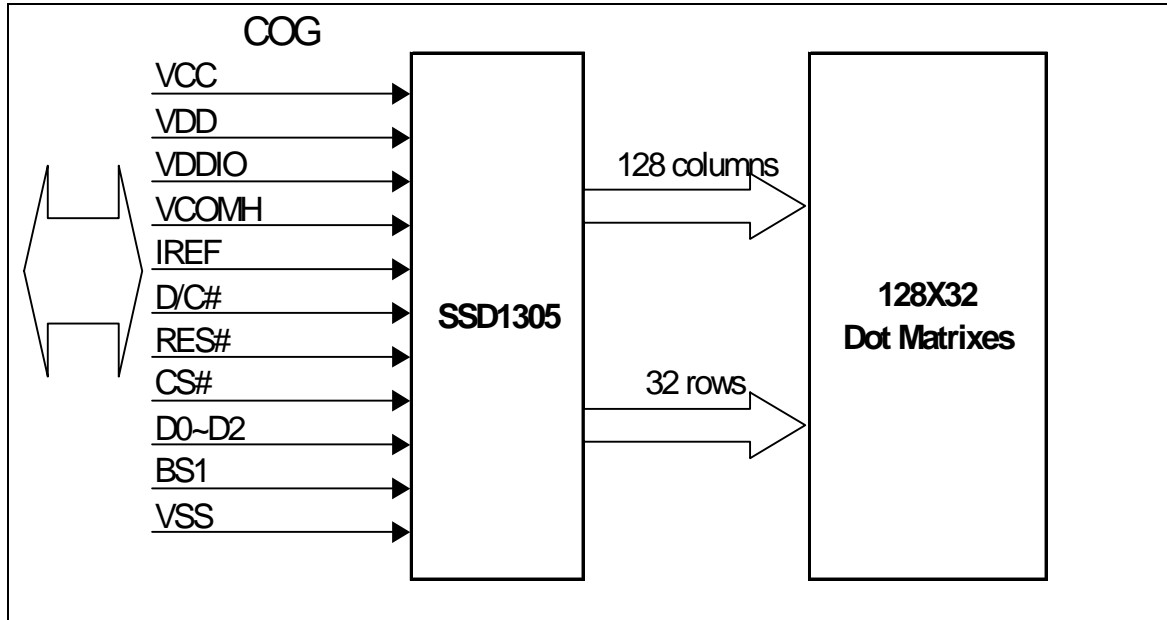
- Driving Voltage : 10V
- Contrast setting : 0x38H
- Frame rate : 105Hz
- Duty setting : 1/32

(2) Standby mode condition :

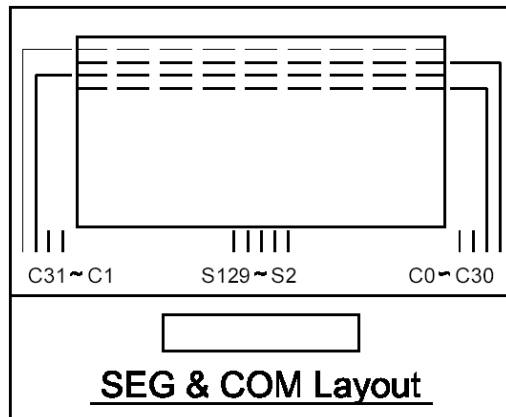
- Driving Voltage : 10V
- Contrast setting : 0x00H
- Frame rate : 105Hz
- Duty setting : 1/32

7. INTERFACE

7.1 FUNCTION BLOCK DIAGRAM



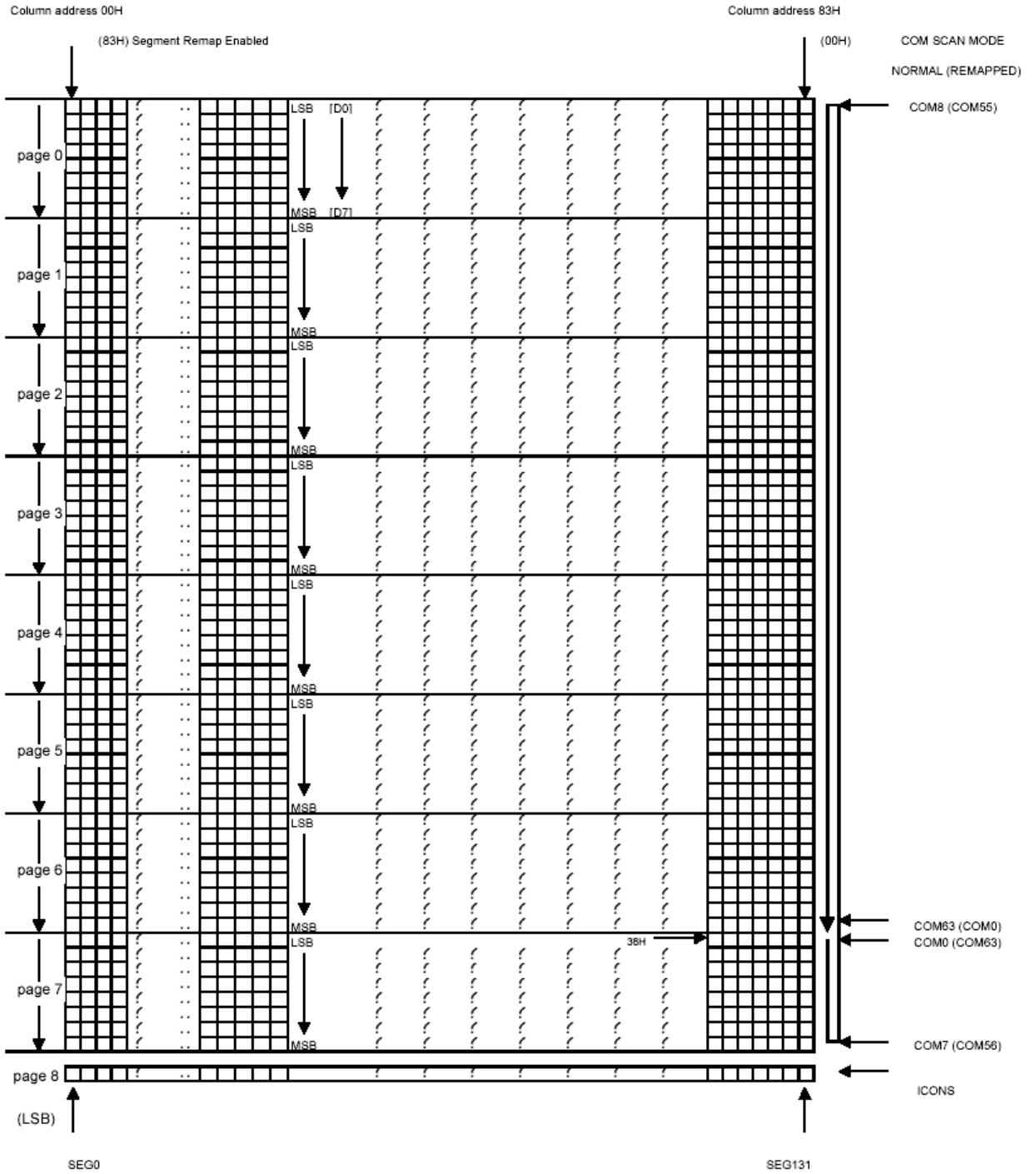
7.2 PANEL LAYOUT DIAGRAM



7.3 PIN ASSIGNMENTS

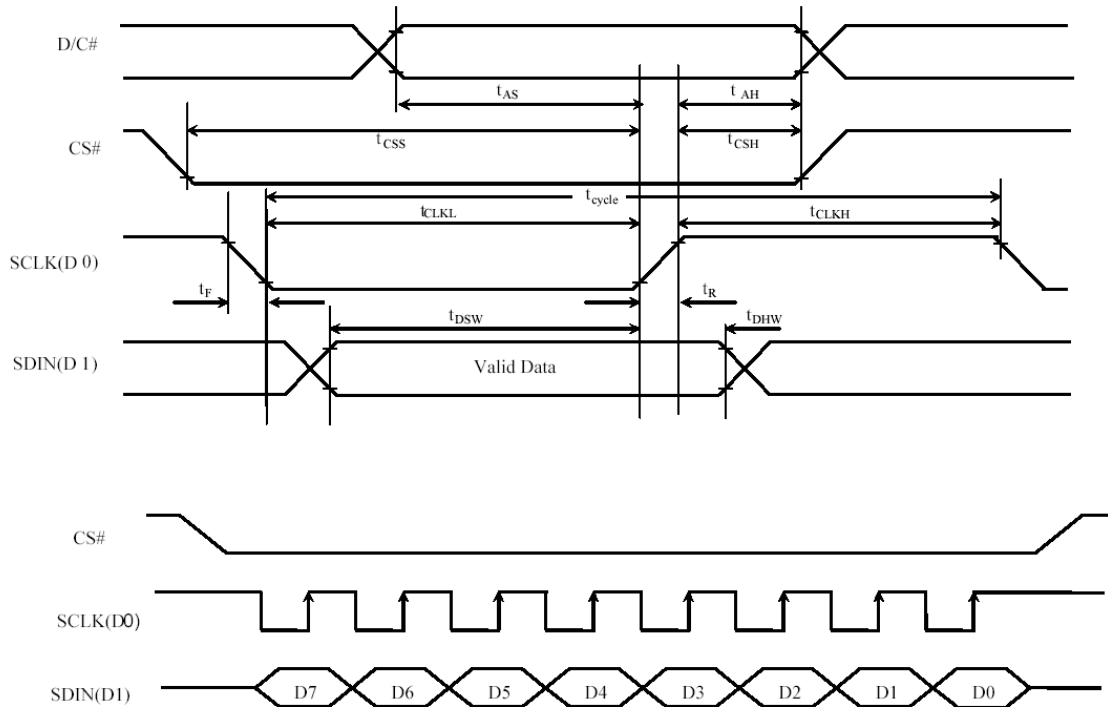
PIN NAME	PIN NO	DESCRIPTION
NC	1	No connection.
VSS	2	Ground.
VCC	3	Power supply for analog circuit.
VCOMH	4	Com Voltage Output. A capacitor should be connected between this pin and V_{SS} .
IREF	5	Reference current input pin. A resistor should be connected between this pin and V_{SS} .
D2	6	In SPI application, the pin should be floated.
D1	7	Data bus(SDIN)
D0	8	Data bus(SCLK)
D/C#	9	Data/ Command control. Pull high for write/read display data. Pull low for write command or read status.
RES#	10	Reset signal input. When it's low, initialization of SSD1305 is executed.
CS#	11	Chip select input.
BS1	12	Interface select pin. SPI: Active Low.
VDDIO	13	This pin is a power supply pin of I/O buffer.
VDD	14	Power supply for logic circuit.
VSS	15	Ground.
NC	16	No connection.

7.4 GRAPHIC DISPLAY DATA RAM ADDRESS MAP



7.5 INTERFACE TIMING CHART

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	250	-	-	ns
t_{AS}	Address Setup Time	150	-	-	ns
t_{AH}	Address Hold Time	150	-	-	ns
t_{CSS}	Chip Select Setup Time	120	-	-	ns
t_{CSH}	Chip Select Hold Time	60	-	-	ns
t_{DSW}	Write Data Setup Time	50	-	-	ns
t_{DHW}	Write Data Hold Time	15	-	-	ns
t_{CLKL}	Clock Low Time	100	-	-	ns
t_{CLKH}	Clock High Time	100	-	-	ns
t_R	Rise Time	-	-	15	ns
t_F	Fall Time	-	-	15	ns

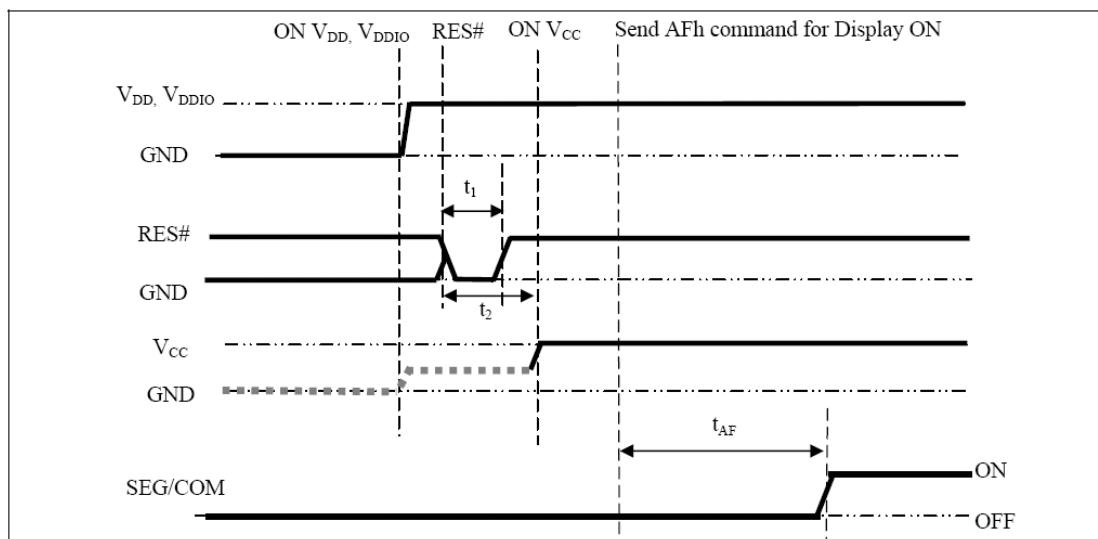


8. POWER ON / OFF SEQUENCE & APPLICATION CIRCUIT

8.1 POWER ON / OFF SEQUENCE

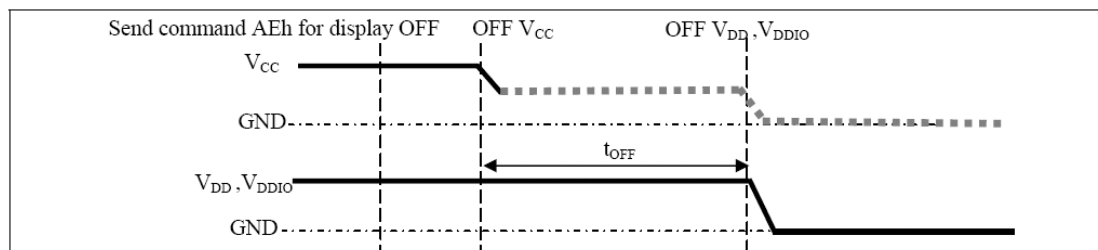
Power ON sequence:

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:

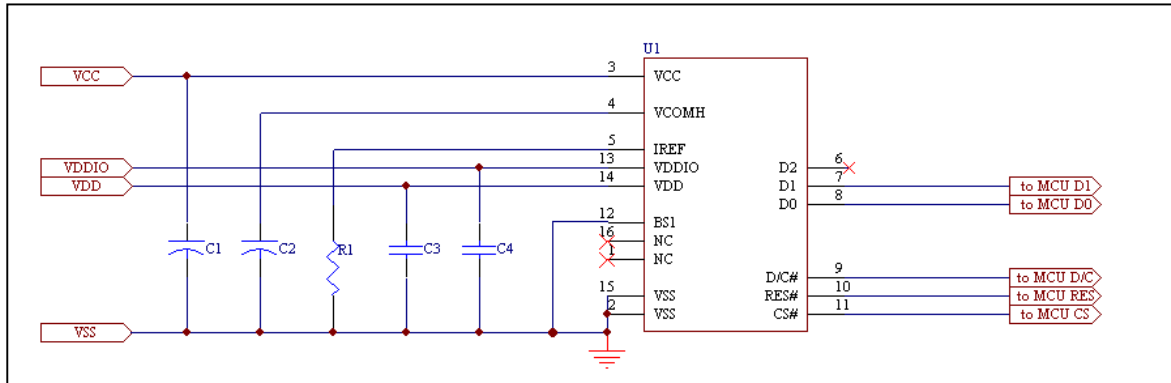
1. Send command AEh for display OFF.
2. Power OFF V_{CC} . (1), (2)
3. Wait for t_{OFF} . Power OFF V_{DD} , V_{DDIO} . (where Minimum $t_{OFF}=80ms$, Typical $t_{OFF}=100ms$)



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



VDDIO must always be equal or lower than VDD.

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

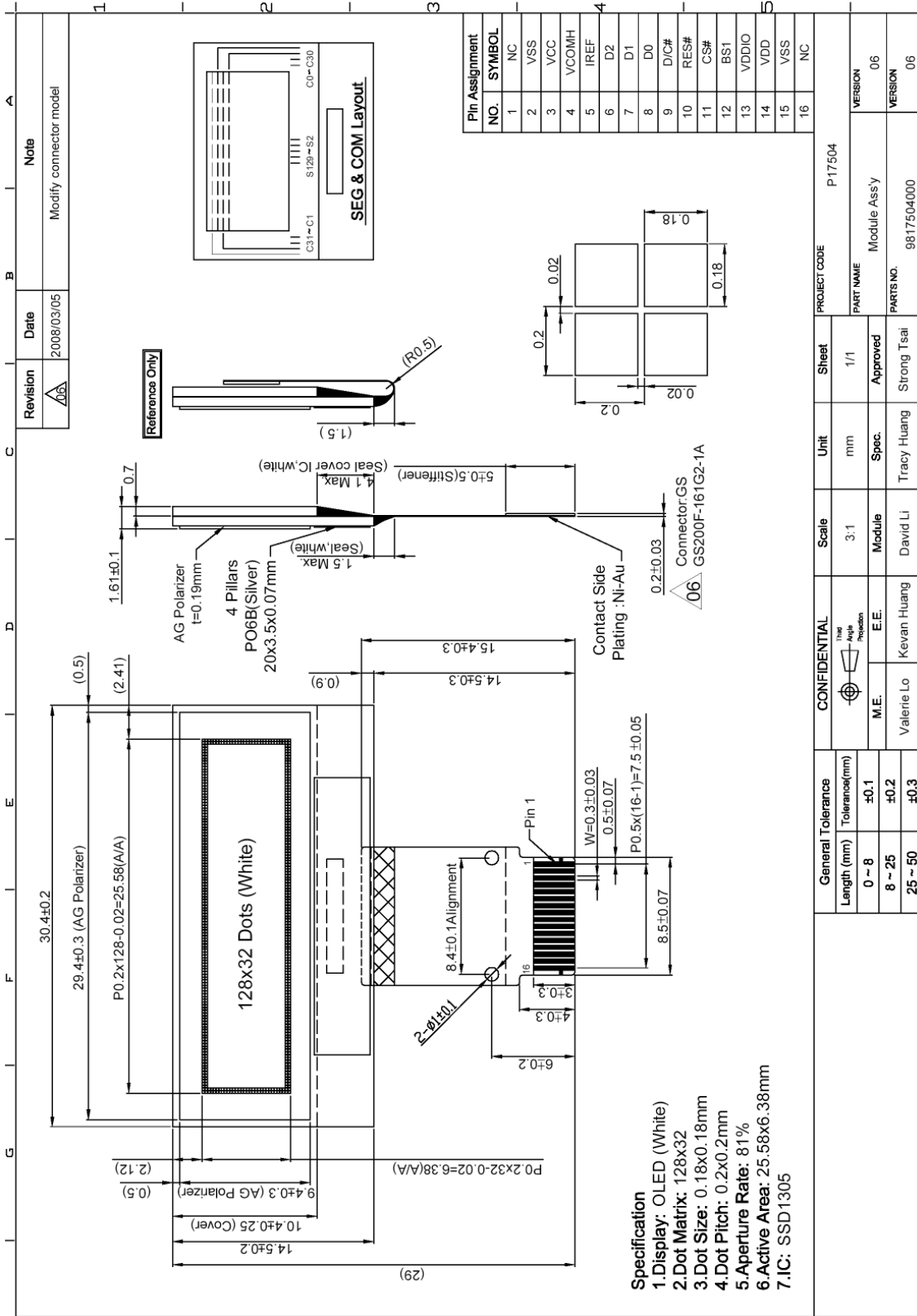
Test and measurement conditions

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

Evaluation criteria

1. The function test is OK.
2. No observable defects.
3. Luminance: > 50% of initial value.
4. Current consumption: within \pm 50% of initial value.

10. EXTERNAL DIMENSION



11. PACKING SPECIFICATION

	Revision	Date	Note
A1	2007/05/15	Packing Tray Instruction	

3008000098
Tray 330x270x8.7mm T=0.7mm, PS, P17501

① Face up ,Rotate packing

9817504000 ②
Module Assy For P17504
x60 pcs

3010000002
5G 矽膠乾燥劑
x4 pcs

3010000002
5G 矽膠乾燥劑
x 1 pcs (empty)

Tray =21 pcs
⑨ 封箱膠帶
3208000125

3003000012
真空包裝袋ONY/LDPE
480x285x90

抽真空:4 sec

3003000013
Antistatic Bubble bag 420x(350+450)mm

3001000005
Pizza Box 345x285x88, B浪

3006000000
Label x2 pcs

3006000000
Label x2 pcs

3000000009
單色 Carton 385x305x203mm

3006000000
Label x1 pcs

3006000000
Label x2 pcs

3208000125
封箱膠帶

Rotate stack

ITEM	PART No.	DESC	QTY
1	9817504000	Module Assy For P17504	1
2	3008000098	Tray 330x270x8.7 T:0.7mm PS P17501	2400
3	3010000002	5G 矽膠乾燥劑	42
4	3003000012	真空包裝袋ONY/LDPE 480x285x90	8
5	3003000013	Antistatic Bubble bag 420x(350+450)mm	2
6	3001000005	Pizza Box 345x285x88 B浪	2
7	3000000009	單色 Carton 385x305x203mm	1
8	3006000000	Label	3
9	3208000125	封箱膠帶, W=48mm, L=910cm	

General Tolerance		CONFIDENTIAL	Scale	Unit	Sheet	PROJECT CODE	
Length (mm)	Tolerance(mm)	 M.I.E. E.E. Kevan Huang Valerie Lo	1:15	mm	1/1	P17504	
0 ~ 8	±0.1		Module	Spec.	Approved	PART NAME	
8 ~ 25	±0.2					Packing Tray Instruction	
25 ~ 50	±0.3				Strong Tsai	VERSION	
						01	
						9917504000	VERSION
							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.

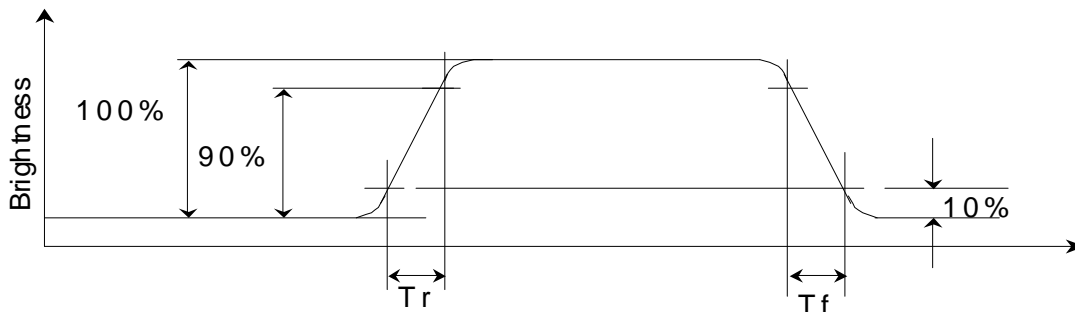


Figure 2: Response time

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.

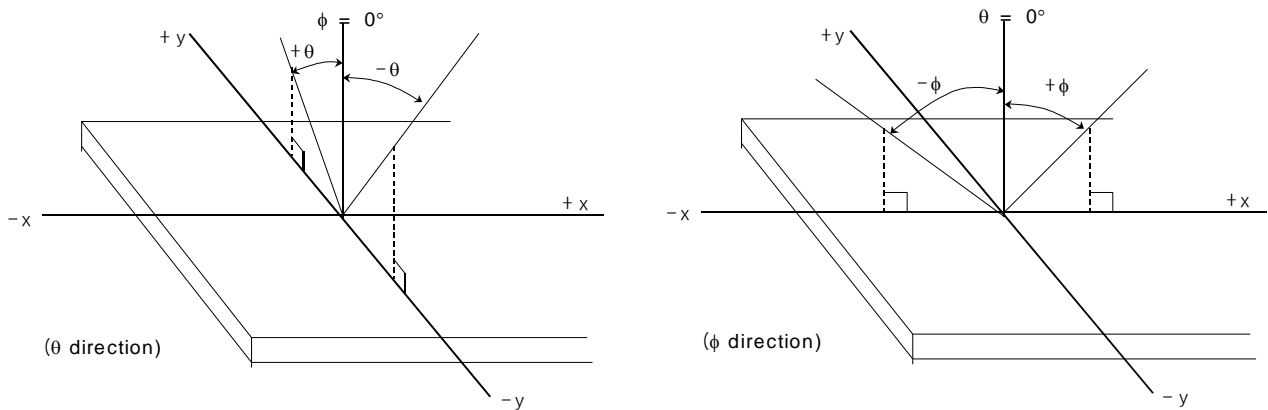
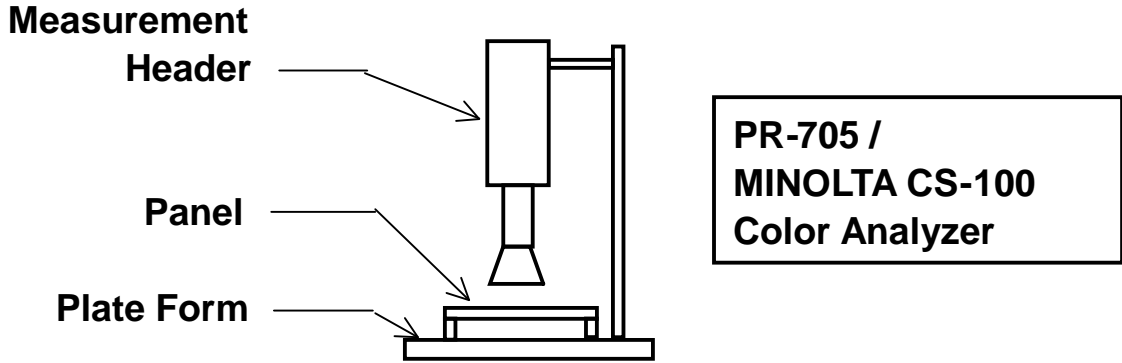


Figure 3: Viewing Angle

APPENDIX 2: MEASUREMENT APPARATUS

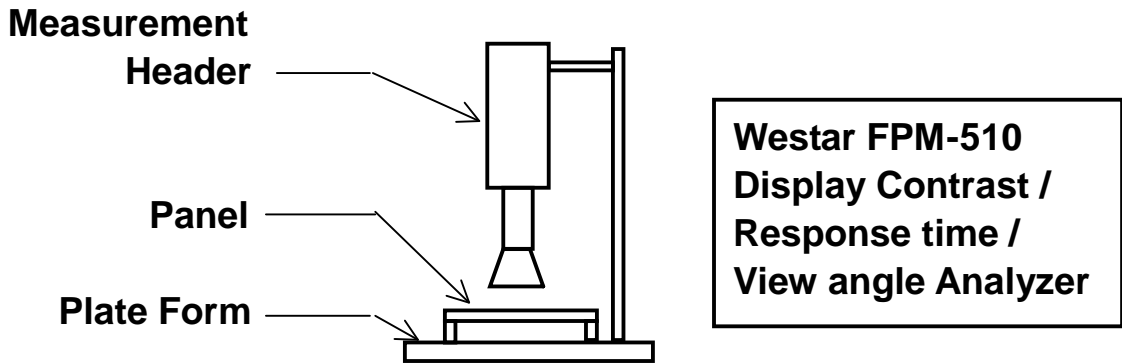
A. LUMINANCE/COLOR COORDINATE

PHOTO RESEARCH PR-705, MINOLTA CS-100

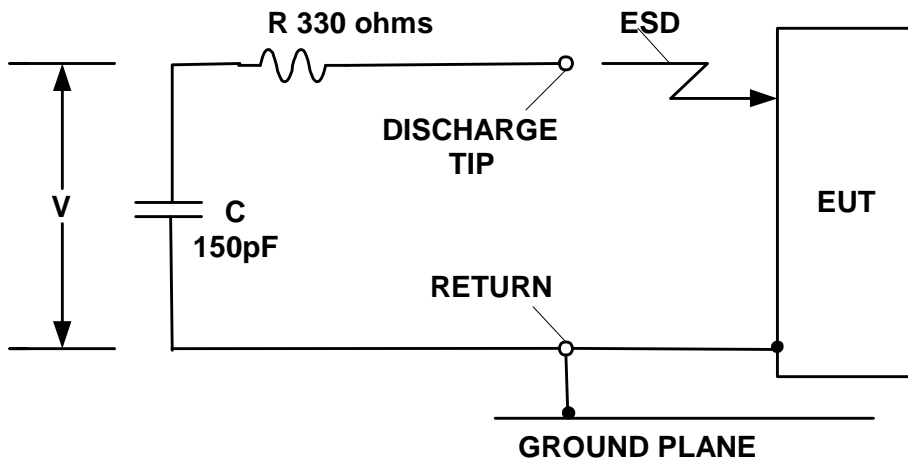


B. CONTRAST / RESPONSE TIME / VIEW ANGLE

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.