Specification for Approval

PRODUCT NAME: **RGS24128064YW002**
PRODUCT NO.: **9909703000**

CUSTOMER
APPROVED BY
DATE:

RITDISPLAY CORP. APPROVED

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
X01	INITIAL RELEASE	2005. 08. 16	
X02	■ Append module weight. ■ Modify lifetime test conditions. ■ Modify lifetime definition. ■ Append panel electrical specification. ■ Modify CIE coordination. ■ Modify typical brightness.	2005. 11. 22	Page 5, 6 & 8
A01	■ Modify features ■ Modify wide range of operating temperature ■ Modify lifetime specification ■ Add the operating conditions for different luminance ■ Modify the panel electrical specification ■ Modify luminance specification ■ Modify CIE specification ■ Modify application circuit ■ Add DC-DC circuit ■ Modify reliability test conditions ■ Append packing specification	2006. 04. 20	Page 4, 6, 7, 8, 13, 14, 15 & 17

CONTENTS

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 Assembly Drawing, is the highest-level specification for this product. It describes the product, identifies supporting documents and contains specifications, which are either not addressed, or are exceptions to the supporting documents.

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 Emission Diode.
- Color : Yellow
- Panel matrix : 128*64
- Driver IC : SSD1303T10
- Excellent Quick response time : 10μs
- Extremely thin thickness for best mechanism design : 2.05 mm
- High contrast : 500:1
- Wide viewing angle : 160°
- Strong environmental resistance.
- Wide range of operating temperature : -40 to 85°C
- Anti-glare polarizer.

4. MECHANICAL DATA

NO	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	128 (W) x 64 (H)	dot
2	Dot Size	0.4 (W) x 0.4 (H)	mm^2
3	Dot Pitch	0.43 (W) x 0.43 (H)	mm^2
4	Aperture Rate	86	%
5	Active Area	55.01 (W) x 27.49 (H)	mm^2
6	Panel Size	65.5 (W) x 40.0 (H)	mm^2
7	Panel Thickness	2.05 ± 0.1	mm
8	Module Size	65.5 (W) x 59.6 (H) x 2.213 (D)	mm^3
9	Diagonal A/A size	2.4	inch
10	Module Weight	11.1 ± 10%	gram

5. MAXIMUM RATINGS

ITEM	MIN	MAX	UNIT	Condition	Remark
Supply Voltage (V_{DD})	-0.3	+3.5	V	Ta = 25 °C	
Supply Voltage(Vcc)	8	16	V	Ta = 25 °C	
Operating Temp.	-40	85	°C		
Storage Temp	-40	85	°C		
Humidity		85	%		
Life Time	40,000	-	Hrs	100 cd/m², 50% checkerboard	Note (1)
Life Time	50,000	-	Hrs	80 cd/m², 50% checkerboard	Note (2)
Life Time	66,000	-	Hrs	60 cd/m², 50% checkerboard	Note (3)

Note:

(A) Under VCC = 12 Volts, Ta = 25°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 100 cd/m² :

- Contrast setting : 0xDDH
- Frame rate : 85Hz
- Duty setting : 1/64

(2) Setting of 80 cd/m² :

- Contrast setting : 0x9EH
- Frame rate : 85Hz
- Duty setting : 1/64

(3) Setting of 60 cd/m² :

- Contrast setting : 0x5FH
- Frame rate : 85Hz
- Duty setting : 1/64

6. ELECTRICAL CHARACTERISTICS

6.1 D.C ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETERS	TEST CONDITION	MIN	TYP	MAX	UNIT
V_{CC}	Analog power supply (for OLED panel)	Ta=-20 °C to +70°C	11.5	12	12.5	V
V_{DD}	Digital power supply	Ta=-20 °C to +70°C	2.4	2.7	3.5	V
I_{DD}	Operating current for V_{DD} V_{DD} = 2.7V, V_{CC} = 12V, I_{REF} = 10uA No loading, All Display ON	Contrast=FF	-	190	-	uA
I_{CC}	Operating current for V_{CC} V_{DD} = 2.7V, V_{CC} = 12V, I_{REF} = 10uA All Display ON	Contrast=FF	-	550	-	uA
V_{IH}	High logic input level		0.8* V_{DD}	-	V_{DD}	V
V_{IL}	Low logic input level		0	-	0.2* V_{DD}	V
V_{OH}	High logic output level		0.9* V_{DD}	-	V_{DD}	V
V_{OL}	Low logic output level		0	-	0.1* V_{DD}	V
I_{SEG}	Segment on output current V_{DD}=2.7V, V_{CC}=12V, IREF=10uA, Display on, Segment pin under test is connected with a 20K resistive load to V_{SS}	Contrast=FF	-	-	300	uA
		Contrast=AF	-	220	-	uA
		Contrast=5F	-	120	-	uA
		Contrast=0F	-	20	-	uA

Note 1: V_{DD}= 2.7V；V_{CC}= 12V；Frame rate=85Hz；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		28	30	mA	All pixels on (1)
Standby mode current		2	3	mA	Standby mode 10% pixels on (2)
Normal mode power consumption		336	360	mW	All pixels on (1)
Standby mode power consumption		24	36	mW	Standby mode 10% pixels on (2)
Normal mode Luminance	60	80		cd/m^2	Display Average
Standby mode Luminance		30		cd/m^2	
CIEx(Yellow)	0.42	0.46	0.50		x, y (CIE 1931)
CIEy(Yellow)	0.44	0.48	0.52		
Dark Room Contrast	500:1				
Viewing Angle	160			degree	
Response Time		10		μs	

(1) Normal mode condition :

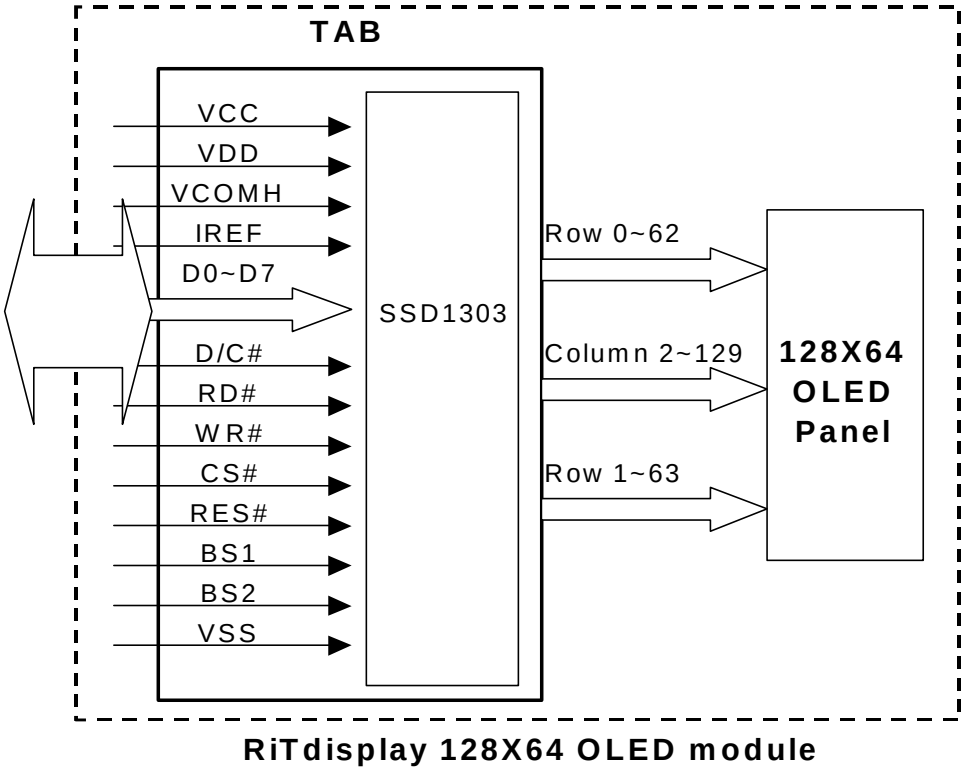
- Driving Voltage : 12V
- Contrast setting : 0x9EH
- Frame rate : 85Hz
- Duty setting : 1/64

(2) Standby mode condition :

- Driving Voltage : 12V
- Contrast setting : 0x01H
- Frame rate : 85Hz
- Duty setting : 1/64

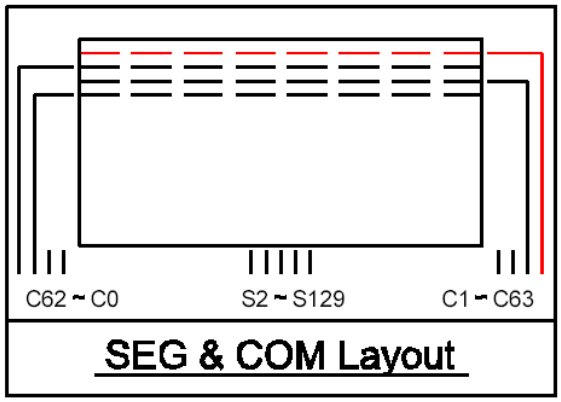
7. INTERFACE

7.1 FUNCTION BLOCK DIAGRAM



RiTdisplay 128X64 OLED module

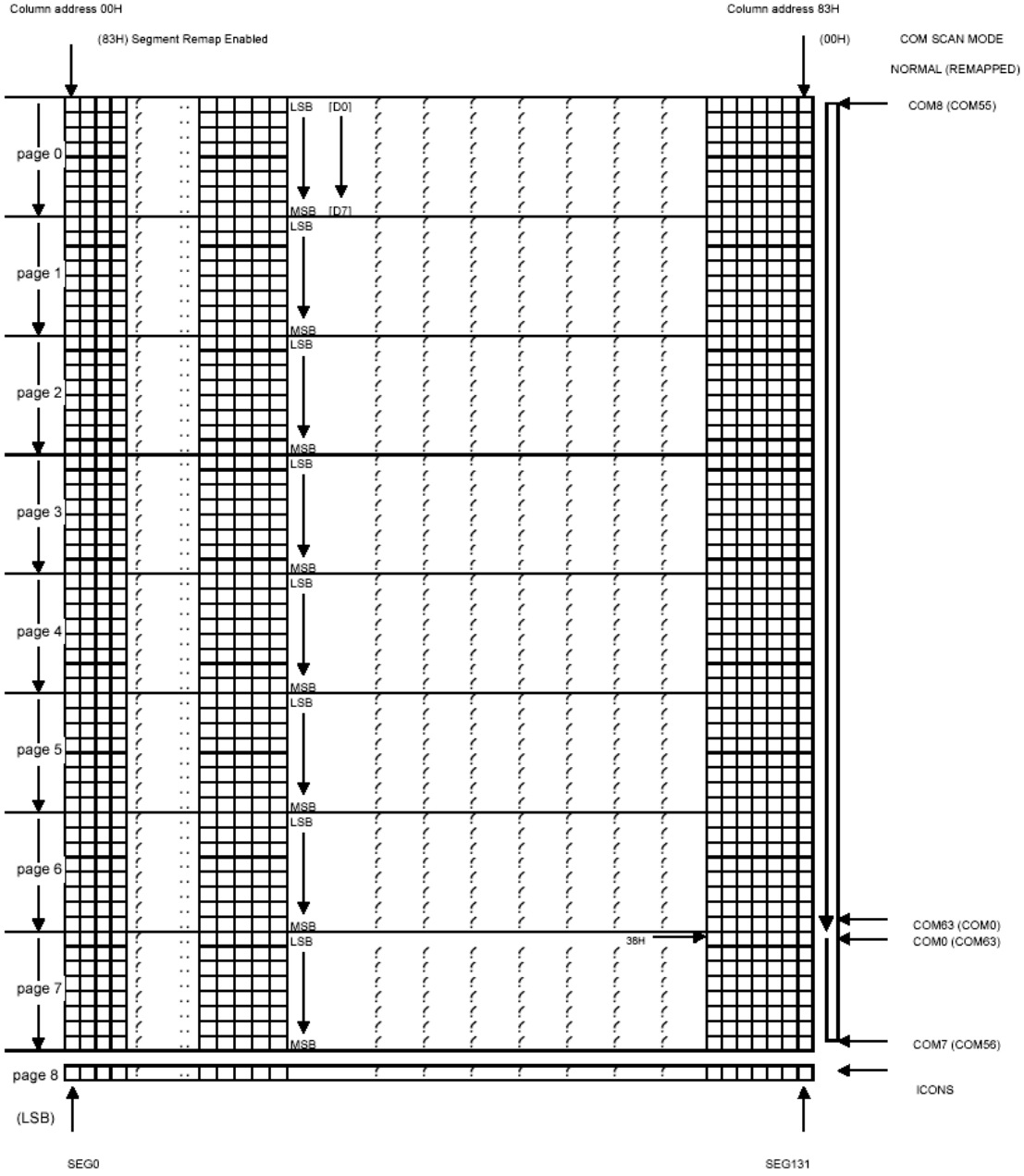
7.2 PANEL LAYOUT DIAGRAM



7.3 PIN ASSIGNMENTS

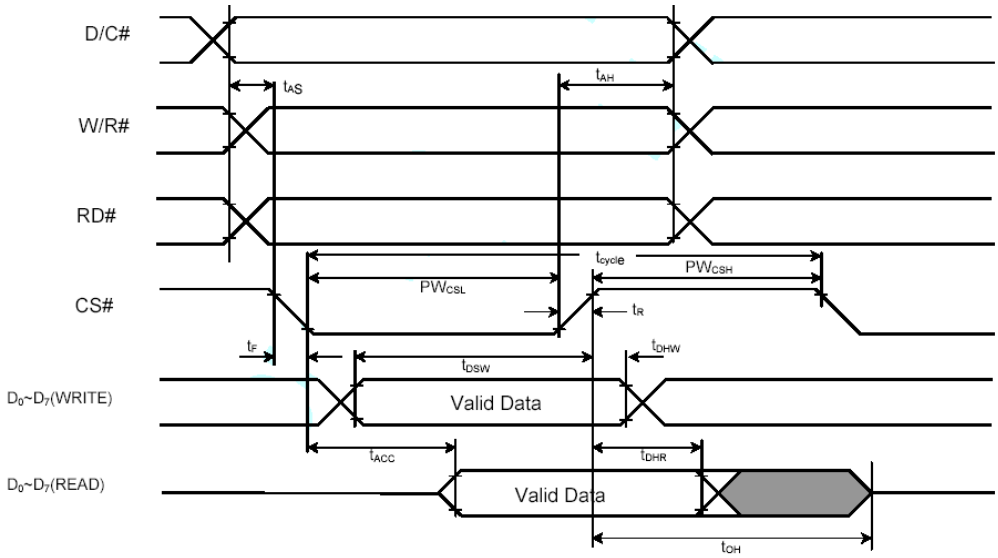
Pin No.	Pin Name	TYPE	Description
1	NC	-	No connection
2	VSS	I	Ground
3	TEST0	-	Reserved pin; No connection and left float.
4	TEST1	-	Reserved pin; No connection and left float.
5	TEST2	-	Reserved pin; No connection and left float.
6	TEST3	-	Reserved pin; No connection and left float.
7	TEST4	-	Reserved pin; No connection and left float.
8	NC	-	No connection
9	NC	-	No connection
10	NC	-	No connection
11	VDD	I	Logic power supply
12	BS1	I	MCU interface input selection pins.
13	BS2	I	MCU interface input selection pins.
14	NC	-	No connection
15	CS	I	Chip selete input pin
16	RES	I	Hardware RESET input pin
17	D/C	I	H: Data input; L: Command input.
18	WR	I	This pin is used to receive the Write Data signal.
19	RD	I	This pin is used to receive the Read Data signal.
20	D0	I/O	8 bits MPU data bus I/O
21	D1	I/O	
22	D2	I/O	
23	D3	I/O	
24	D4	I/O	
25	D5	I/O	
26	D6	I/O	
27	D7	I/O	
28	IREF	I	The current reference input pin, this pin should be connected to ground through a resistor.
29	VCOMH	I	The COM voltage reference input pin, this pin should be connected to ground through a capacitor.
30	VCC	I	Analog power supply input.
31	NC	-	No connection

7.4 GRAPHIC DISPLAY DATA RAM ADDRESS MAP



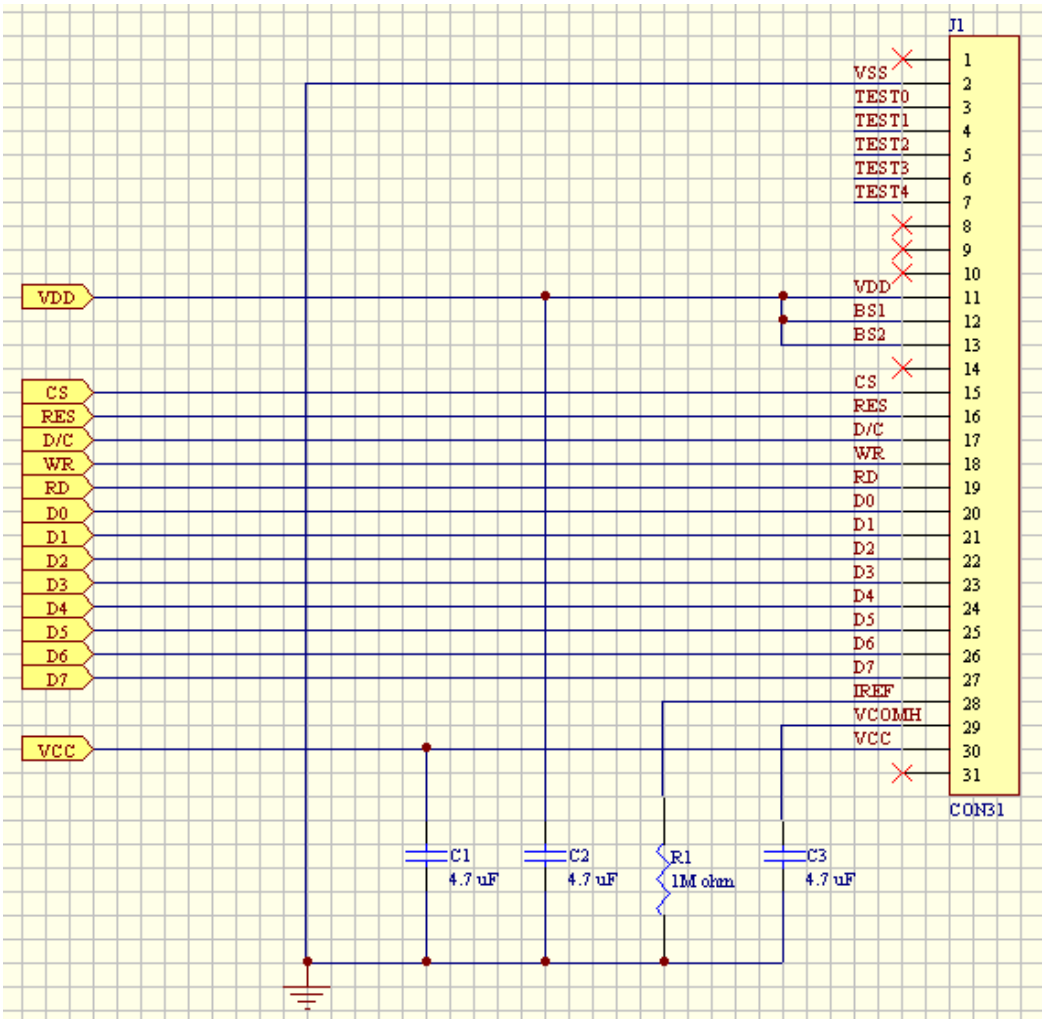
7.5 INTERFACE TIMING CHART

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	300	-	-	ns
t_{AS}	Address Setup Time	0	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	15	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	Access Time	-	-	140	ns
PW_{CSL}	Chip Select Low Pulse Width (read) Chip Select Low Pulse Width (write)	120 60	-	-	ns
PW_{CSH}	Chip Select High Pulse Width (read) Chip Select High Pulse Width (write)	60 60	-	-	ns
t_R	Rise Time	-	-	15	ns
t_F	Fall Time	-	-	15	ns



8. APPLICATION CIRCUIT

8.1 APPLICATION CIRCUIT



Recommend components:

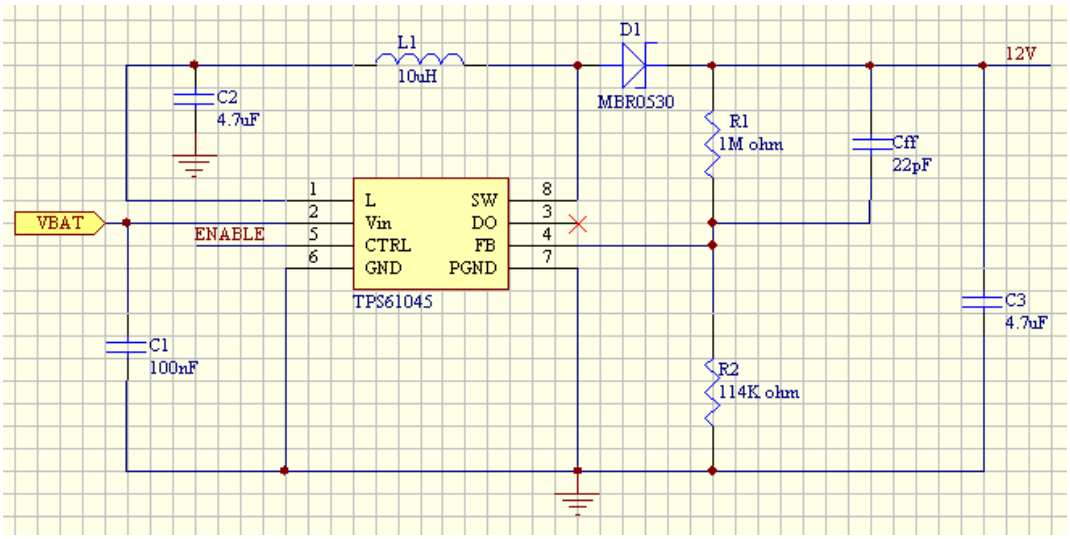
C1,C3 : 4.7uF/25V (Tantalum type);

C2 : 4.7uF(0805) /16V,

Resistor: 1M ohm(0603), 1%

This circuit is designed for 8080 interface

DC-DC Circuit



Customer should adjust the R1 and R2 value.

C2 and C3: 4.7uF / 25V (Tantalum type)

(The value of each component can refer to tps61045 IC datasheet)

8.2 COMMAND TABLE

Refer to IC Spec.: SSD1303

9. RELIABILITY TEST CONDITIONS

No.	Items	Specification	Quantity
1	High temp. (Non-operation)	85°C, 240hrs	5
2	High temp. (Operation)	85°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

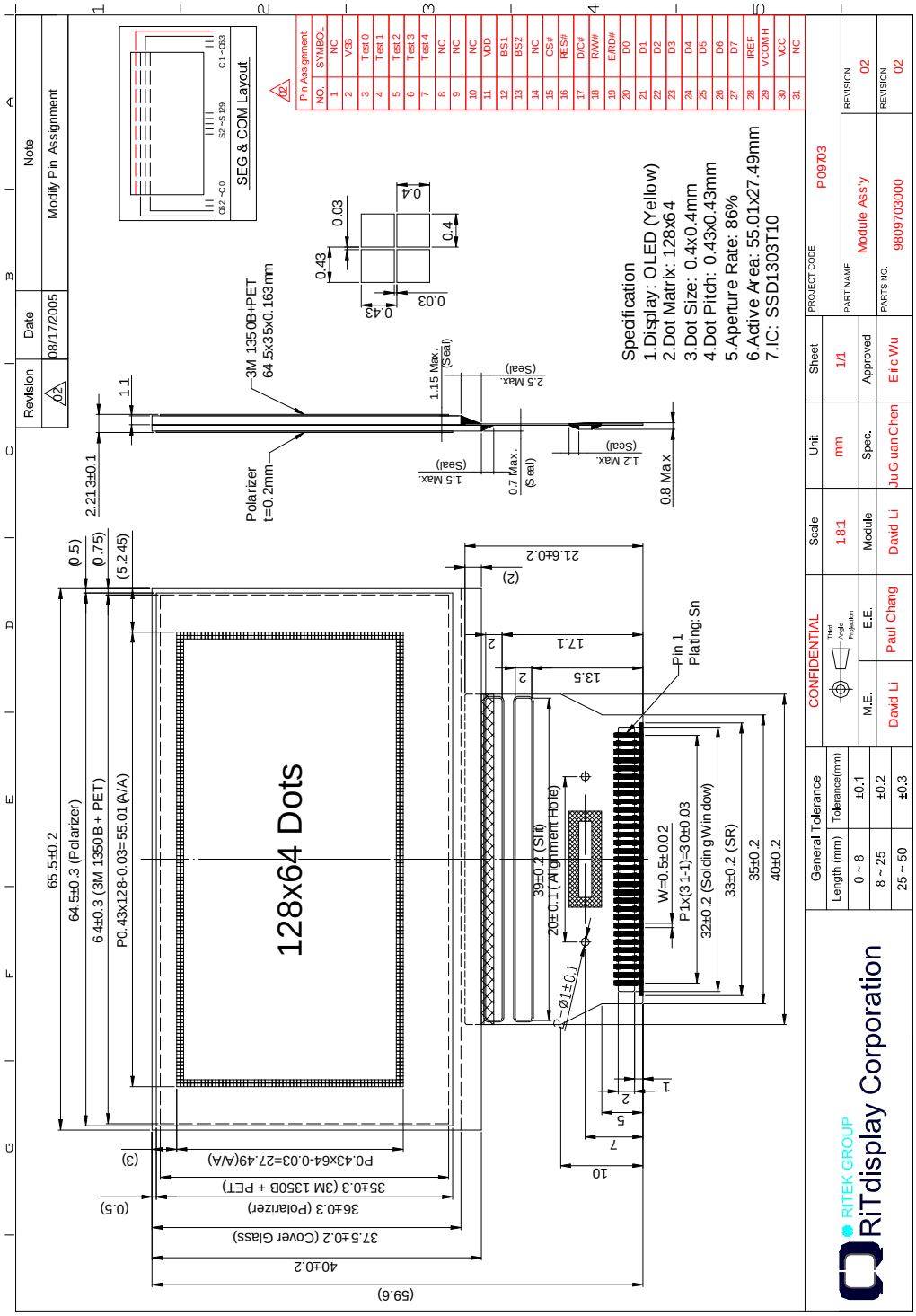
Test and measurement conditions

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, 2 & 4.

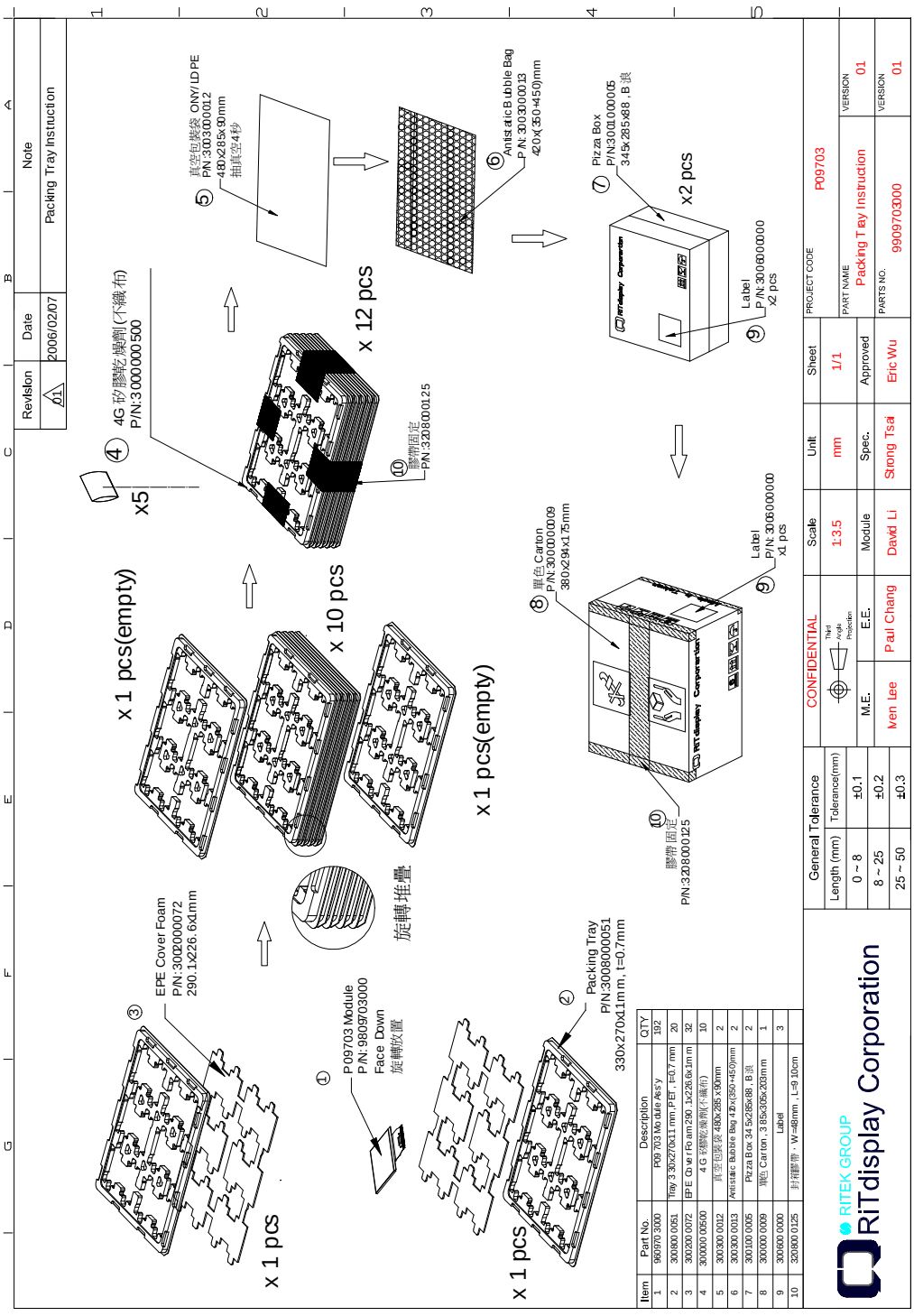
Evaluation criteria

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

10. EXTERNAL DIMENSION



11. PACKING SPECIFICATION



Item	Part No.	Description	QTY
1	9809703000	P09703 Module Assy	192
2	3008000051	Tray 3.30x270x11 mm ,PET , t=0.7 mm	20
3	3002000072	EPE Cover Foam 290.1x226.6x1mm	32
4	3000000500	4G 矽膠吃模劑(不織布)	10
5	3003000012	真空包裝袋 480x285 x90mm	2
6	3003000013	Antistatic Bubble Bag 48x(360+450)mm	2
7	3001000005	Pizza Box 34 5x285x88 . B浪	2
8	3000000009	黑色 Carton , 3 85x305x203mm	1
9	3006000000	Label	3
10	3208000125	封箱膠帶 , W=48mm , L=9.16cm	

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 Tr 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 Tf 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.

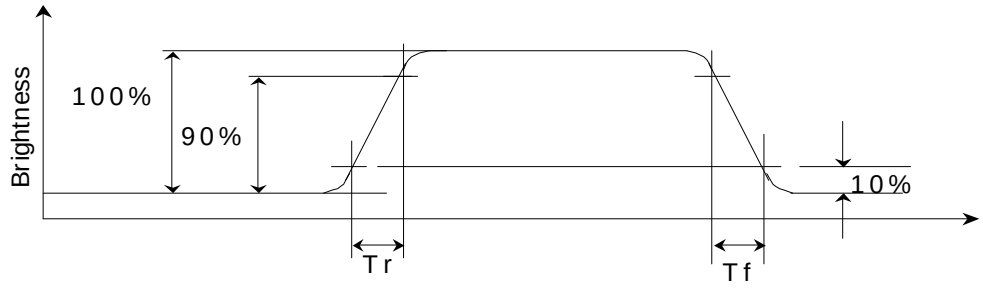
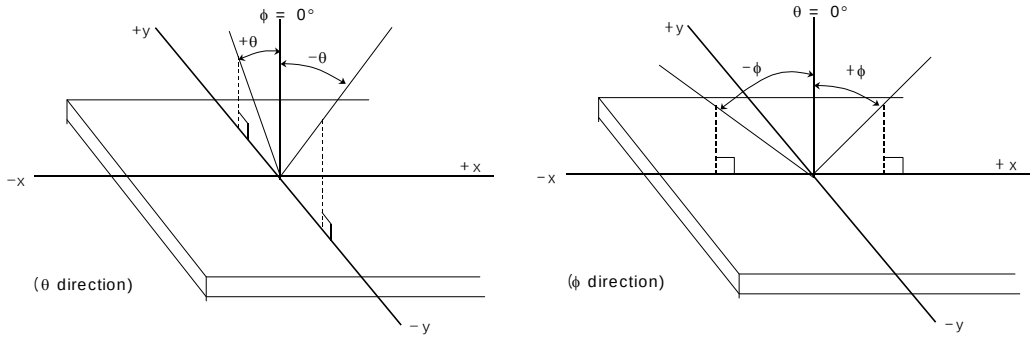


Figure 2 Response time

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.



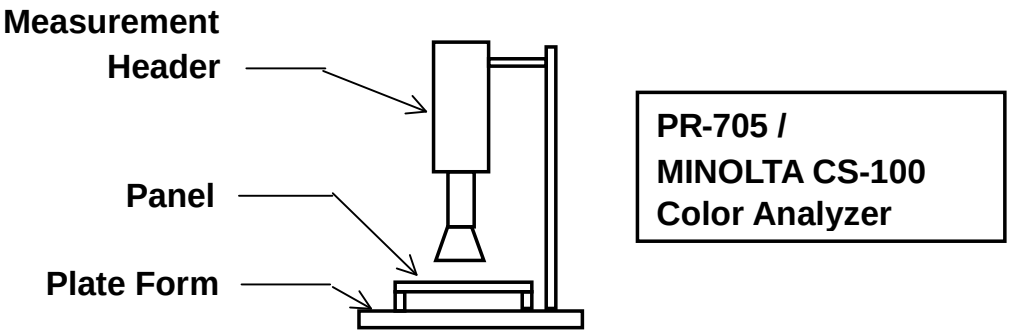
Vertical angles **Horizontal angles**

Figure 3 Viewing Angle

APPENDIX 2: MEASUREMENT APPARATUS

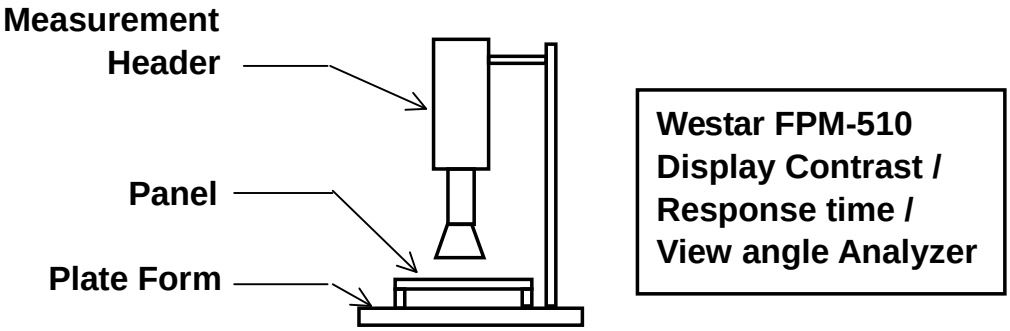
A. LUMINANCE/COLOR COORDINATE

PHOTO RESEARCH PR-705, MINOLTA CS-100

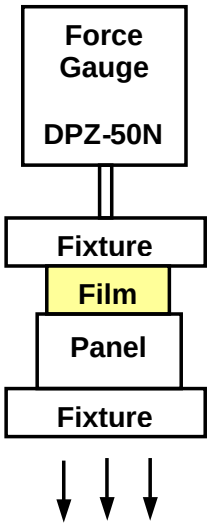


B. CONTRAST / RESPONSE TIME / VIEWING ANGLE

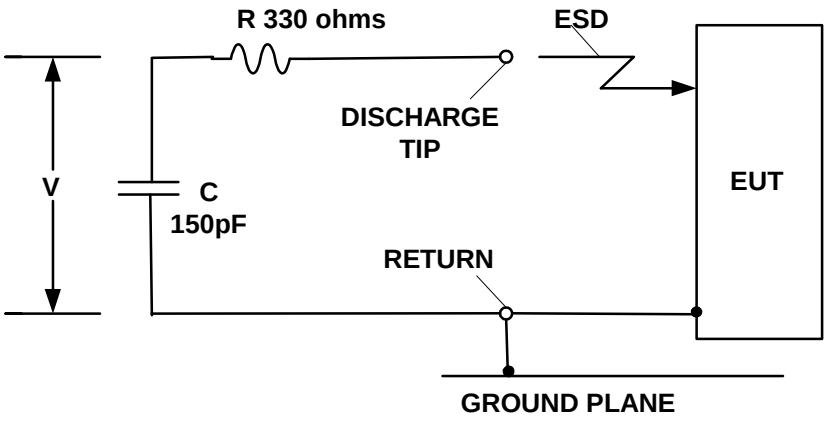
WESTAR CORPORATION FPM-510



C. PEEL STRENGTH



D. 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.