

# Preliminary Specification

Part Number: PMO22101

<b>CUSTOMER</b>
<b>APPROVED BY</b>
<b>DATE:</b>

Pacer International PLC

## REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
X01	■ INITIAL RELEASE	2008. 05. 26	
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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 Pacer . 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.

## **2. WARRANTY**

Pacer 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 ("WarrantyPeriod"). Pacer 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, Pacer 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 : Yellow
- Panel resolution : 128\*128
- Driver IC : SSD1327
- Excellent Quick response time : 10 $\mu$ s
- Extremely thin thickness for best mechanism design : 1.41 mm
- High contrast : 2000:1
- Wide viewing angle : 160°
- Strong environmental resistance.
- 8-bit 6800-series Parallel Interface, 8-bit 8080-series Parallel Interface, Serial Peripheral Interface, I<sup>2</sup>C Interface.
- Wide range of operating temperature : -40 to 70°C
- Anti-glare polarizer.

#### **4. MECHANICAL DATA**

NO	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	128 x 128	dot
2	Dot Size	0.19 (W) x 0.19 (H)	mm <sup>2</sup>
3	Dot Pitch	0.21 (W) x 0.21 (H)	mm <sup>2</sup>
4	Aperture Rate	82	%
5	Active Area	26.86 (W) x 26.86 (H)	mm <sup>2</sup>
6	Panel Size	33.8 (W) x 36.5 (H)	mm <sup>2</sup>
7	Panel Thickness	1.41 ± 0.1	mm
8	Module Size	33.8 (W) x 43.7 (H) x 1.41 (T)	mm <sup>3</sup>
9	Diagonal A/A size	1.5	inch
10	Module Weight	TBD	gram

## **5. MAXIMUM RATINGS**

ITEM	MIN	MAX	UNIT	Condition	Remark
Supply Voltage (V <sub>ci</sub> )	-0.3	3.5	V	Ta = 25°C	IC maximum rating
Supply Voltage (V <sub>cc</sub> )	8	18	V	Ta = 25°C	IC maximum rating
Operating Temp.	-40	70	°C		
Storage Temp	-40	85	°C		
Humidity		85	%		
Life Time	TBD	-	Hrs	TBD cd/m <sup>2</sup> , 50% checkerboard	Note (1)

Note:

(A) Under V<sub>cc</sub> = TBD, 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 TBD cd/m<sup>2</sup> :

- Contrast setting : TBD
- Frame rate : 105Hz
- Duty setting : 1/128

## 6. ELECTRICAL CHARACTERISTICS

### 6.1 D.C ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETERS	TEST CONDITION	MIN	TYP	MAX	UNIT
$V_{CC}$	Driver power supply (for OLED panel)	$T_a = -20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$	TBD	TBD	TBD	V
$V_{CI}$	Low voltage power supply	$T_a = -20^{\circ}\text{C}$ to $+70^{\circ}\text{C}$	2.6	2.7	3.5	V
$V_{OH}$	Hi logic output level	$I_{out} = 100\ \mu\text{A}$ , 3.3MHz	0.9* $V_{CI}$	-	$V_{CI}$	V
$V_{OL}$	Low logic output level	$I_{out} = 100\ \mu\text{A}$ , 3.3MHz	0	-	0.1* $V_{CI}$	V
$V_{IH}$	Hi logic input level	$I_{out} = 100\ \mu\text{A}$ , 3.3MHz	0.8* $V_{CI}$	-	$V_{CI}$	V
$V_{IL}$	Low logic output level	$I_{out} = 100\ \mu\text{A}$ , 3.3MHz	0	-	0.2* $V_{CI}$	V
$I_{CC}$	Operating current for $V_{CC}$	Contrast=7F	-	-	TBD	$\mu\text{A}$
$I_{CI}$	Operating current for $V_{CI}$	Contrast=7F	-	-	TBD	$\mu\text{A}$
$I_{SEG}$	Segment output current	Contrast=7F	-	-	-	$\mu\text{A}$
		Contrast=5F	-	-	-	$\mu\text{A}$
		Contrast=3F	-	-	-	$\mu\text{A}$
		Contrast=1F	-	-	-	$\mu\text{A}$

Note :  $V_{CI} = 2.7\ \text{V}$  ;  $V_{CC} = \text{TBD}$  ; Frame rate= 105Hz ; No panel attached.

## 6.2 ELECTRO-OPTICAL CHARACTERISTICS

### PANEL ELECTRICAL SPECIFICATIONS

PARAMETER	MIN	TYP.	MAX	UNITS	COMMENTS
Normal mode current consumption	-	TBD	TBD	mA	All pixels on
Standby mode current consumption	-	TBD	TBD	mA	Standby mode 10% pixels on
Normal mode power consumption	-	TBD	TBD	mW	All pixels on
Standby mode power consumption	-	TBD	TBD	mW	Standby mode 10% pixels on
Pixel Luminance	TBD	TBD		cd/m <sup>2</sup>	Display Average
Standby Luminance		TBD		cd/m <sup>2</sup>	
CIE <sub>x</sub> (Yellow)	0.43	0.47	0.51		CIE1931
CIE <sub>y</sub> (Yellow)	0.45	0.49	0.53		CIE1931
Dark Room Contrast	2000:1				
Viewing Angle	160			degree	
Response Time		10		μs	

Normal mode condition :

- Driving Voltage : TBD
- Contrast setting : TBD
- Frame rate : 105Hz
- Duty setting : 1/128

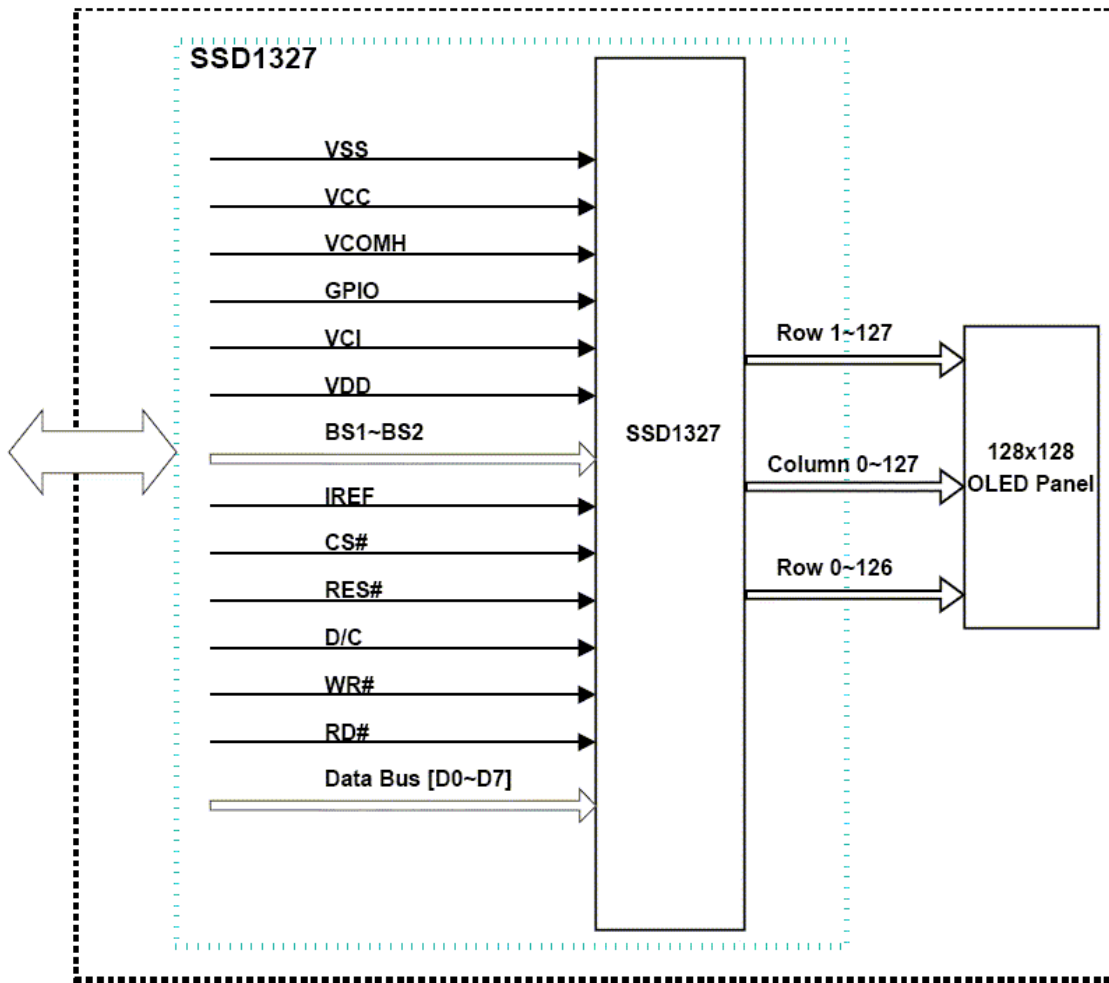
Standby mode condition :

- Driving Voltage : TBD
- Contrast setting : TBD
- Frame rate : 105Hz
- Duty setting : 1/128



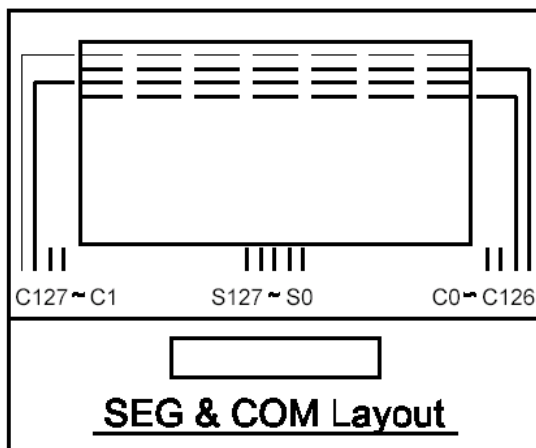
## 7. INTERFACE

### 7.1 FUNCTION BLOCK DIAGRAM



RiTdisplay 128X128 OLED Module

### 7.2 PANEL LAYOUT DIAGRAM



### 7.3 PIN ASSIGNMENTS

PIN NAME	PIN NO	DESCRIPTION
VSS	1	Ground.
VCC	2	Power supply for analog circuit.
VCOMH	3	Com Voltage Output. A capacitor should be connected between this pin and $V_{SS}$ .
GPIO	4	General I/O port.
VCI	5	Power supply for logic circuit.
VDD	6	A capacitor should be connected between this pin and $V_{SS}$ .
BS1	7	MCU bus interface selection pins.
BS2	8	MCU bus interface selection pins.
VSS	9	Ground.
IREF	10	Reference current input pin. A resistor should be connected between this pin and $V_{SS}$ .
CS#	11	Chip select input.
RES#	12	Reset signal input. When it's low, initialization of SSD1327 is executed.
D/C	13	Data/ Command control. Pull high for write/read display data. Pull low for write command or read status.
WR#	14	MCU interface input. Data write operation is initiated when it's pull low.
RD#	15	MCU interface input. Data read operation is initiated when it's pull low.
D0	16	Data bus(for parallel interface)
D1	17	
D2	18	
D3	19	
D4	20	
D5	21	
D6	22	
D7	23	
VCC	24	Power supply for analog circuit.
VSS	25	Ground.

## 7.4 GRAPHIC DISPLAY DATA RAM ADDRESS MAP

TBD

## 7.5 INTERFACE TIMING CHART

TBD

## **8. POWER ON / OFF SEQUENCE & APPLICATION CIRCUIT**

### **8.1 POWER ON / OFF SEQUENCE**

TBD

## 8.2 APPLICATION CIRCUIT

TBD

## 8.3 COMMAND TABLE

Refer to IC Spec.: SSD1327

## **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

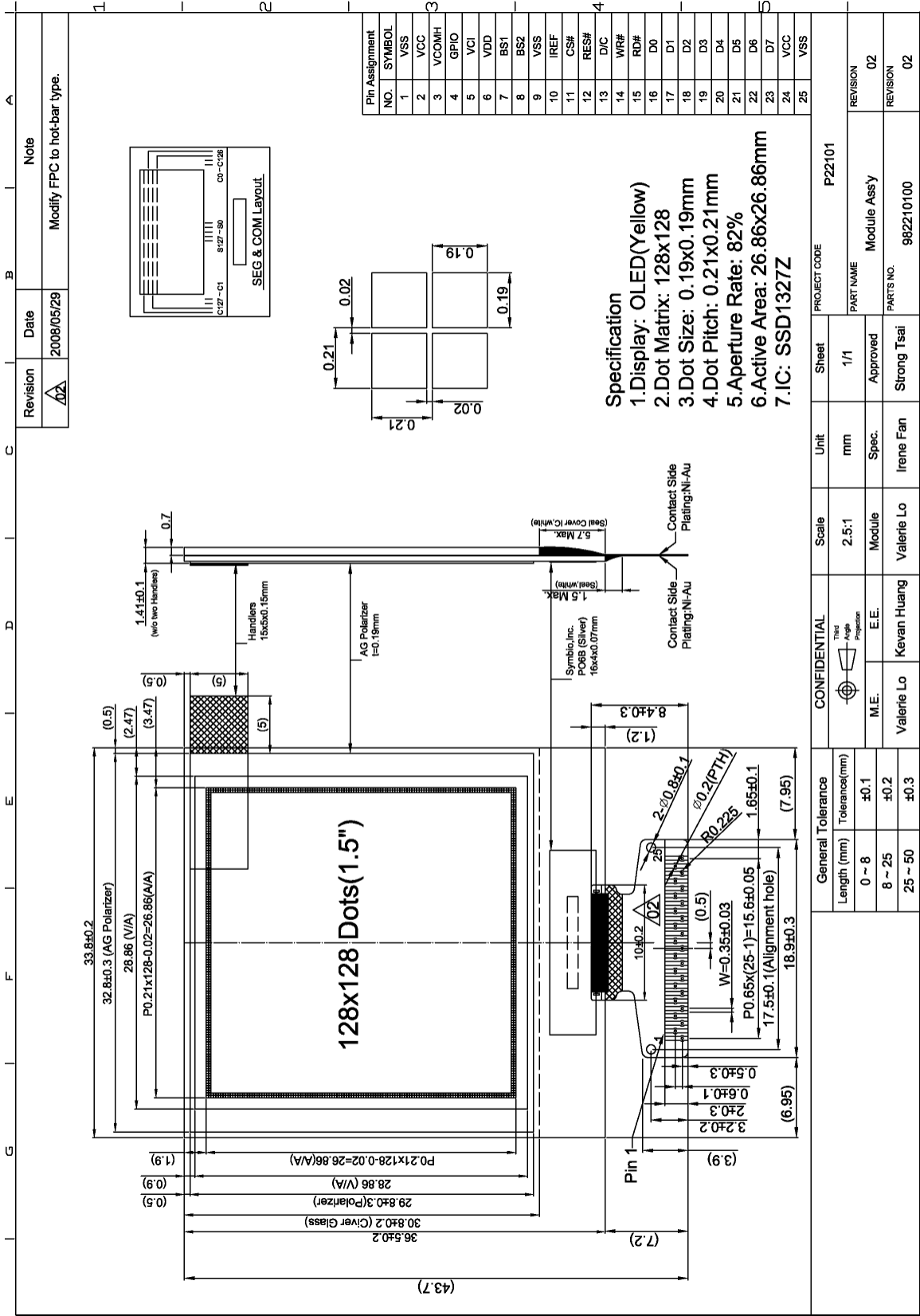
### **Test and measurement conditions**

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**

TBD

## **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.

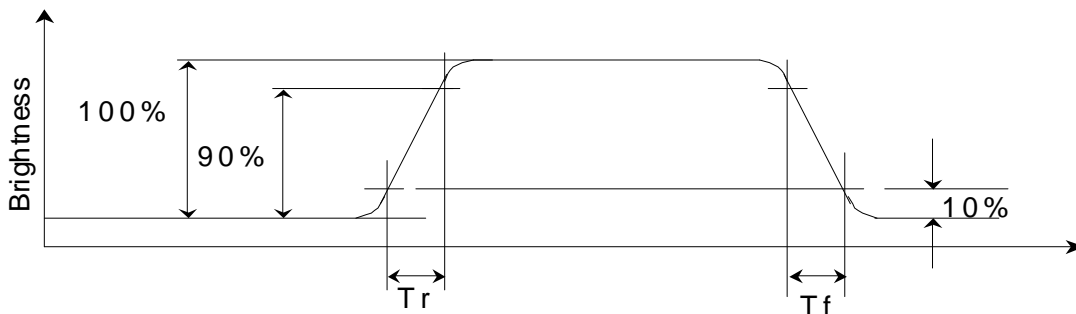
#### **B. DEFINITION OF CONTRAST RATIO**

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**

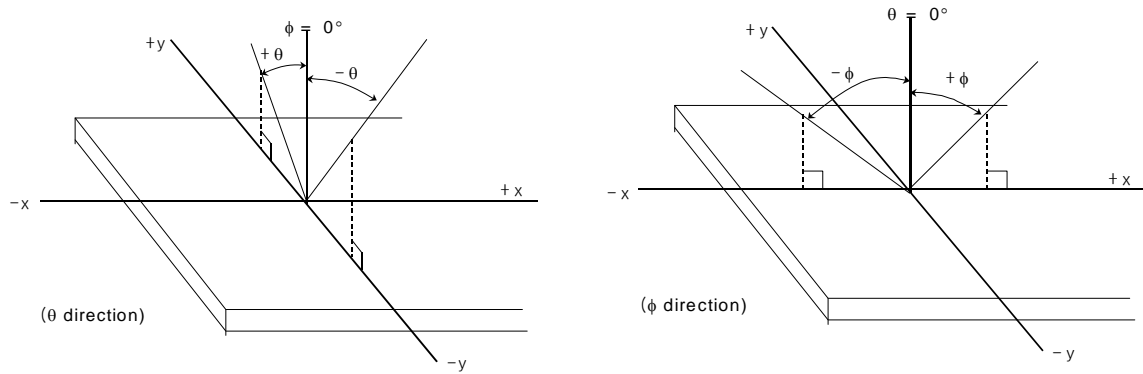
The definition of turn-on response time  $T_r$  is the time interval between a pixel reaching 10% of steady state luminance and 90% of steady state luminance. The definition of turn-off response time  $T_f$  is the time interval between a pixel reaching 90% of steady state luminance and 10% of steady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

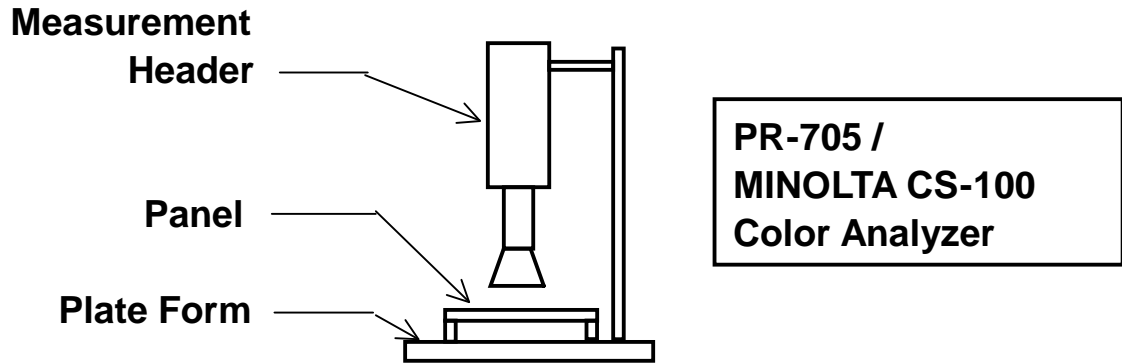


**Figure 3 Viewing angle**

**APPENDIX 2: MEASUREMENT APPARATUS**

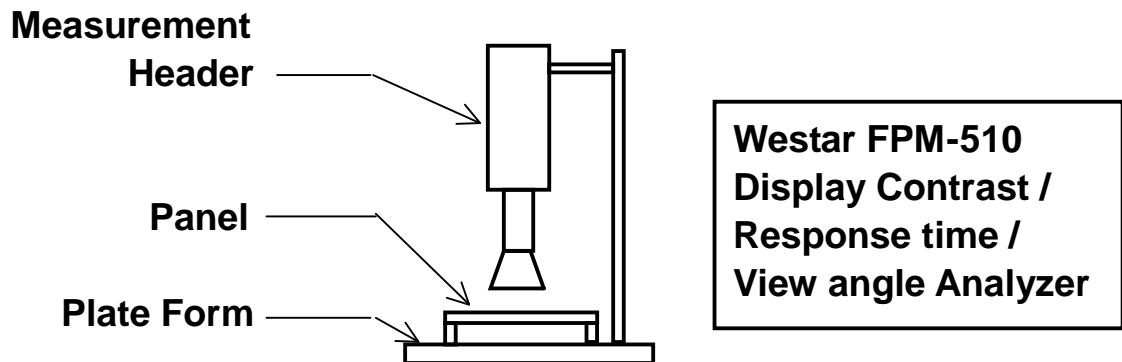
**A. LUMINANCE/COLOR COORDINATE**

PHOTO RESEARCH PR-705, MINOLTA CS-100

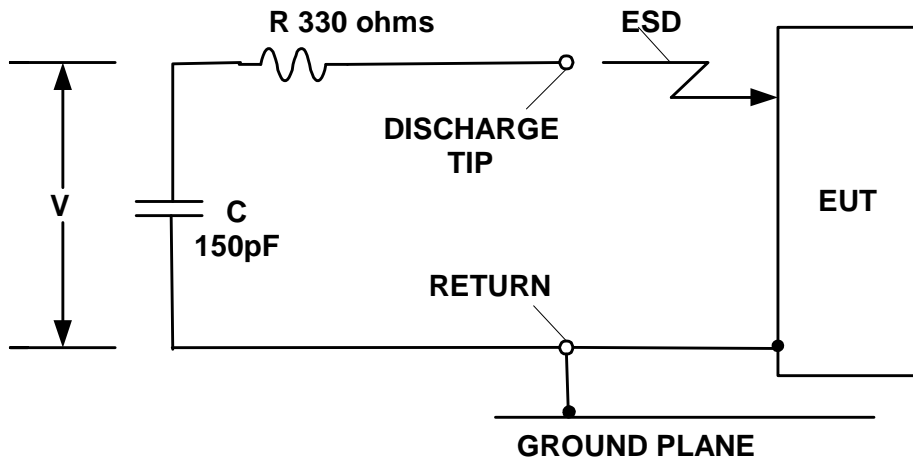


**B. CONTRAST / RESPONSE TIME / VIEWING ANGLE**

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.