

# Specification for Approval

**PRODUCT NAME:** RGC11128036WR005  
**PRODUCT NO.:** 9918001000

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

<b>RITDISPLAY CORP. APPROVED</b>

## REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
X01	INITIAL RELEASE	2007. 01. 22	
X02	<ul style="list-style-type: none"> <li>■ Add note of driver IC</li> <li>■ Modify FPC dimension</li> <li>■ Add the operating conditions for different luminance</li> <li>■ Modify frame rate</li> <li>■ Modify D.C electrical characteristics</li> <li>■ Add panel electrical specifications – current, power consumption, standby mode luminance, driving voltage &amp; contrast setting</li> <li>■ Modify application circuit</li> </ul>	2007. 03. 19	Page 4, 5, 6, 7, 8, 15 & 17
X03	<ul style="list-style-type: none"> <li>■ Modify power on/off sequence</li> <li>■ Modify protective film size</li> </ul>	2007. 06. 22	Page 14 & 17
A01	<ul style="list-style-type: none"> <li>■ Transfer from X version</li> <li>■ Add the information of module weight</li> <li>■ Modify specification of minimum luminance (480→500cd/m<sup>2</sup>)</li> <li>■ Add the packing specification</li> </ul>	2007. 11. 16	Page 5, 8 & 18

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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 Assembly 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\*36
- Driver IC : LDS518 (4 gray scale)
- Excellent quick response time.
- Extremely thin thickness for best mechanism design : 1.0 mm
- High contrast : 2000:1
- Wide viewing angle : 160°
- 8-bit 8080-series parallel interface.
- Wide range of operating temperature : -40 to 70 °C

#### 4. MECHANICAL DATA

NO	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	128 (W) x 36 (H)	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 7.54 (H)	mm <sup>2</sup>
6	Panel Size	31 (W) x 14.3 (H)	mm <sup>2</sup>
7	Panel Thickness	1.0 ± 0.05	mm
8	Module Size	31 (W) x 23.73 (H) x 1.0 (D)	mm <sup>3</sup>
9	Diagonal A/A size	1.1	inch
10	Module Weight	1.01 ± 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	5,000	-	Hrs	All pixels on, Luminance = 600cd/m <sup>2</sup> , $T_a = 25^{\circ}\text{C}$ , 50% RH	Note (1)
Life Time	7,500	-	Hrs	All pixels on, Luminance = 450cd/m <sup>2</sup> , $T_a = 25^{\circ}\text{C}$ , 50% RH	Note (2)
Life Time	10,000	-	Hrs	All pixels on, Luminance = 300cd/m <sup>2</sup> , $T_a = 25^{\circ}\text{C}$ , 50% RH	Note (3)
Life Time	3,500	-	Hrs	All pixels on, Luminance = 300cd/m <sup>2</sup> , $T_a = 50^{\circ}\text{C}$ , 50% RH	Note (3)

Note:

(A) Under  $V_{CC} = 14.5\text{V}$

(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 all pixels on, Luminance = 600cd/m<sup>2</sup> (without polarizer):

- Contrast setting : 0x7F
- Frame rate : 114Hz
- Duty setting : 1/36

(2) Setting of all pixels on, Luminance = 450cd/m<sup>2</sup> (without polarizer):

- Contrast setting : 0x5F
- Frame rate : 114 Hz
- Duty setting : 1/36

(3) Setting of all pixels on, Luminance = 300cd/m<sup>2</sup> (without polarizer):

- Contrast setting : 0x3F
- Frame rate : 114 Hz
- Duty setting : 1/36

## 6. ELECTRICAL CHARACTERISTICS

### 6.1 D.C ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
$V_{CC}$	Driver power supply (for OLED panel)	-	14	14.5	15	V
$V_{DD}$	Logic operating voltage	-	1.65	1.8	3.3	V
$V_{OH}$	High logic output level	$I_{OH} = -0.1\text{Ma}$	$0.85^* V_{DD}$	-	$V_{DD}$	V
$V_{OL}$	Low logic output level	$I_{OL} = +0.1\text{Ma}$	0	-	$0.15^* V_{DD}$	V
$V_{IH}$	High logic input level	-	$0.7^* V_{DD}$	-	$V_{DD}$	V
$V_{IL}$	Low logic input level	-	0	-	$0.3^* V_{DD}$	V
$I_{IL}$	Input leakage voltage	$V_{IN} = V_{DD}$ or $V_{SS}$	-1.0	-	+1.0	$\mu\text{A}$

## 6.2 ELECTRO-OPTICAL CHARACTERISTICS

### PANEL ELECTRICAL SPECIFICATIONS

PARAMETER	MIN	TYP.	MAX	UNITS	COMMENTS
Normal mode current consumption	-	18	20	mA	All pixels on
Standby mode current consumption	-	2	3	mA	Standby mode 10% pixels on
Normal mode power consumption	-	261	290	mW	All pixels on
Standby mode power consumption	-	29	43.5	mW	Standby mode 10% pixels on
Pixel Luminance	500	600		cd/m <sup>2</sup>	Display Average
Standby Luminance		300		cd/m <sup>2</sup>	
CIE <sub>x</sub> (White)	0.28	0.31	0.34		CIE1931
CIE <sub>y</sub> (White)	0.30	0.33	0.36		CIE1931
Dark Room Contrast	2000:1				
Viewing Angle	160			degree	
Response Time		10		μs	
Luminance Uniformity			10	%	

(1) Normal mode condition : (without polarizer)

- Driving Voltage : 14.5V
- Contrast setting : 0x7F
- Frame rate : 114Hz
- Duty setting : 1/36

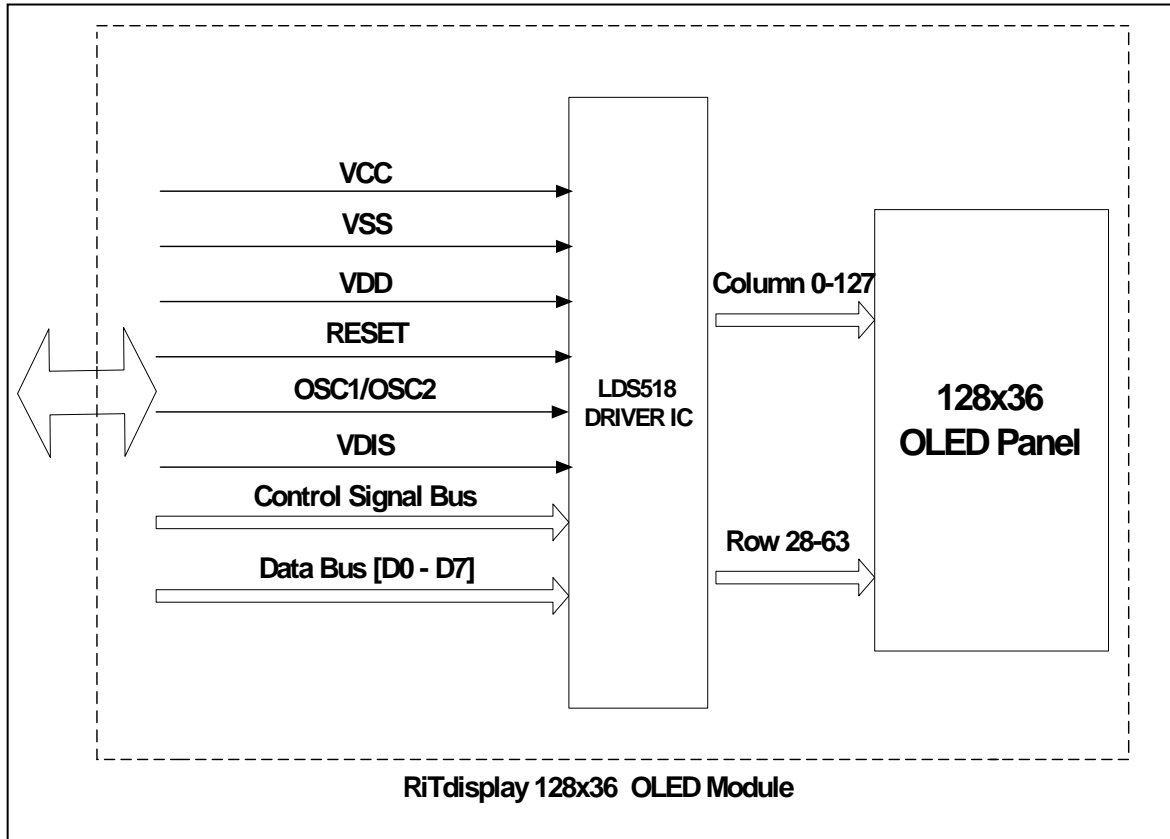
(2) Standby mode condition : (without polarizer)

- Driving Voltage : 14.5V
- Contrast setting : 0x3F
- Frame rate : 114Hz
- Duty setting : 1/36

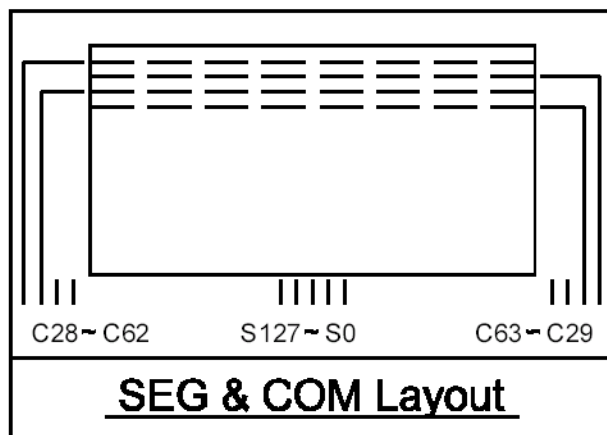


## 7. INTERFACE

### 7.1 FUNCTION BLOCK DIAGRAM



### 7.2 PANEL LAYOUT DIAGRAM



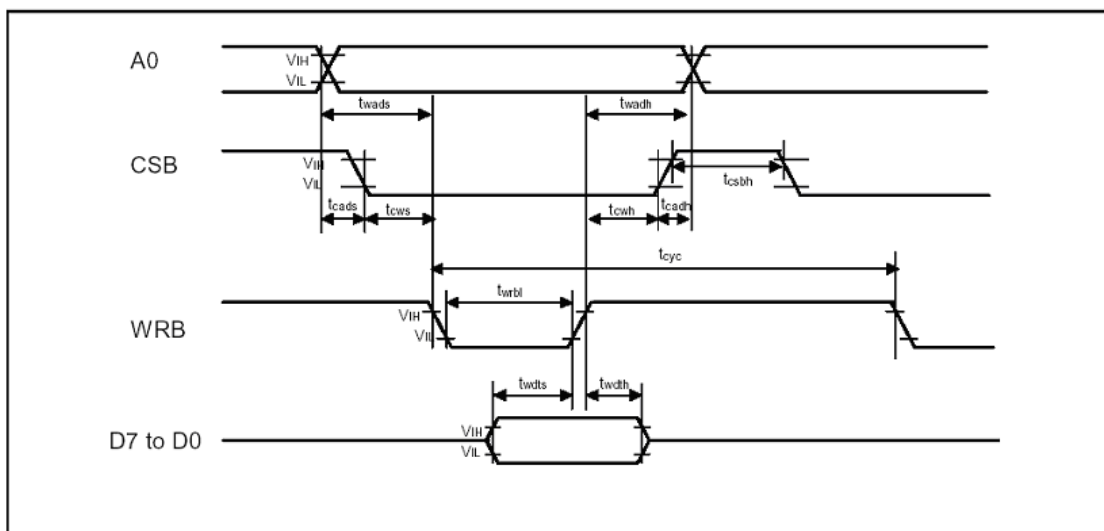
### 7.3 PIN ASSIGNMENTS

PIN NAME	PIN NO.	TYPE	DESCRIPTION
VSS	1	-	Ground
VCC	2	-	High voltage power supply
VDIS	3	I	A zenor diode should be connected between VDIS and VSS
OSC2	4	O	A resistor should be connected between OSC1 and OSC2
OSC1	5	I	
VSS	6	-	Ground
D7	7	I/O	Data bus(for parallel interface)
D6	8	I/O	
D5	9	I/O	
D4	10	I/O	
D3	11	I/O	
D2	12	I/O	
D1	13	I/O	
D0	14	I/O	
A0	15	I	Address ( L: command, H: Parameter)
CS#	16	I	Chip select input ("Low" enable).
RD#	17	I	Read ( Active Low).
WR#	18	I	Write (Active Low).
RESB#	19	I	Chip RESET pin
VSS	20	-	Ground
VDD	21	-	Power supply for logic
VCC	22	-	High voltage power supply
VSS	23	-	Ground



## 7.5 INTERFACE TIMING CHART

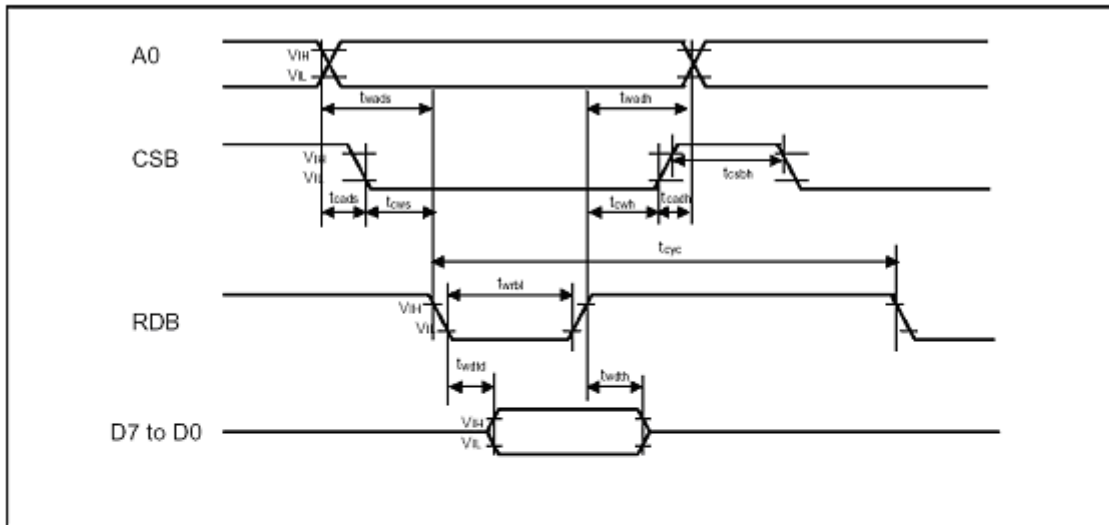
### WRITE CHARACTERISTICS



( $V_{DD} = 1.8V, T_a = 25^\circ C$ )

Symbol	Parameter	Conditions	Related Pins	MIN	TYP	MAX	Unit
$t_{cyc}$	Write cycle time	-	WRB	150	-	-	ns
$t_{cads}$	Address and Select setup time	-	CSB,A0	0	-	-	ns
$t_{cadh}$	Address and Select hold time	-	CSB,A0	0	-	-	ns
$t_{wads}$	Address setup time	-	A0	50	-	-	ns
$t_{wadh}$	Address hold time	-	A0	20	-	-	ns
$t_{csws}$	Select setup time	-	CSB	10	-	-	ns
$t_{cswh}$	Select hold time	-	CSB	10	-	-	ns
$t_{wtbl}$	Write Low pulse width	-	WRB	40	-	-	ns
$t_{csbh}$	Select High pulse width	-	CSB	10	-	-	ns
$t_{wdis}$	Data setup time	-	D7 to D0	10	-	-	ns
$t_{wdth}$	Data hold time	-	D7 to D0	20	-	-	ns

### READ CHARACTERISTICS



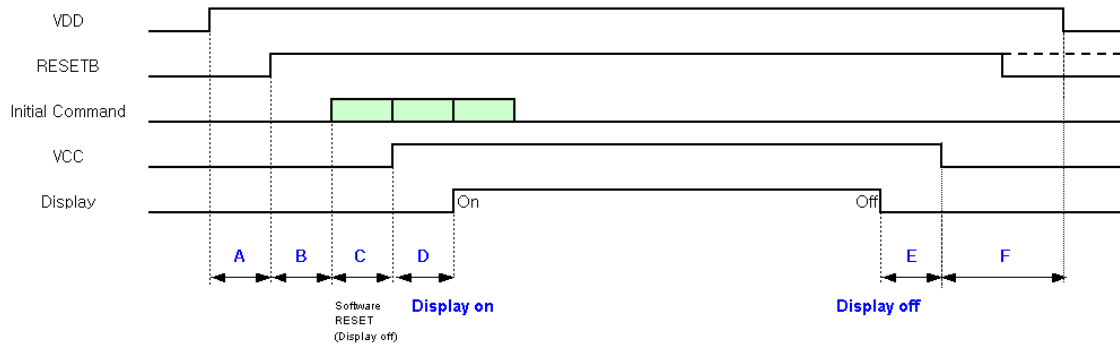
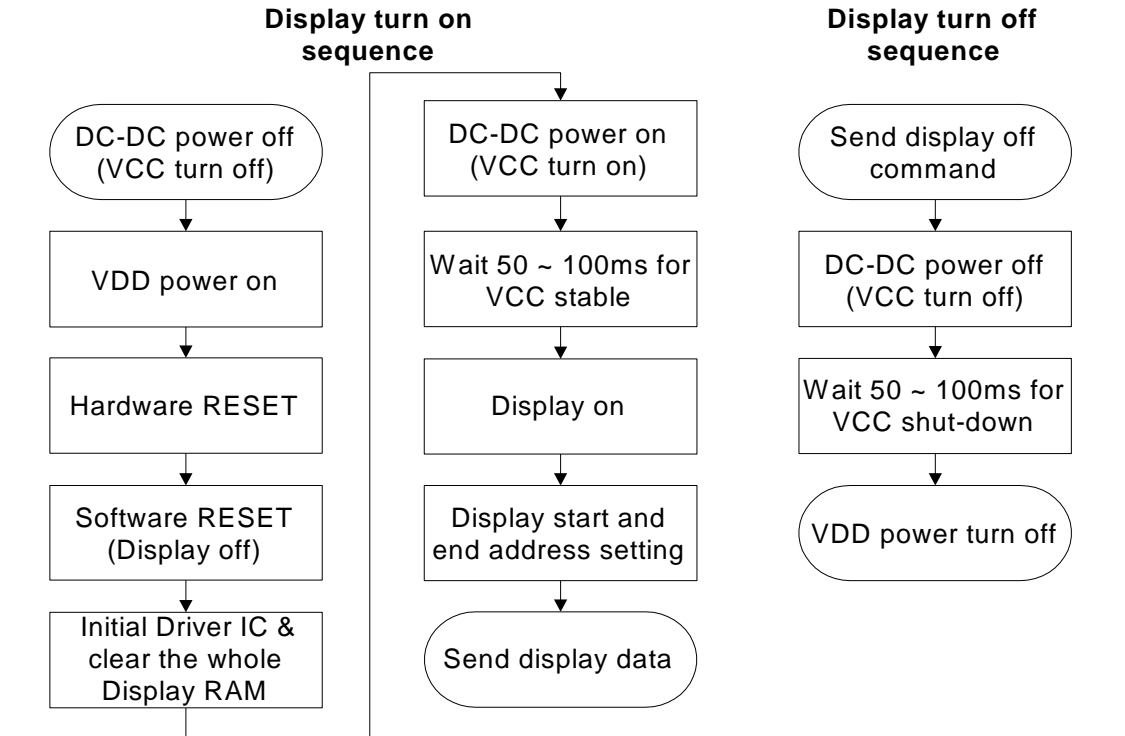
(VDD = 1.8V, Ta = 25 °C)

Symbol	Parameter	Conditions	Related Pins	MIN	TYP	MAX	Unit
$t_{eyc}$	Read cycle time	-	RDB	500	-	-	ns
$t_{eads}$	Address and Select setup time	-	CSB,A0	0	-	-	ns
$t_{eadh}$	Address and Select hold time	-	CSB,A0	0	-	-	ns
$t_{rads}$	Address setup time	-	A0	50	-	-	ns
$t_{radh}$	Address hold time	-	A0	20	-	-	ns
$t_{ors}$	Select setup time	-	CSB	10	-	-	ns
$t_{oh}$	Select hold time	-	CSB	10	-	-	ns
$t_{rtbl}$	Read Low pulse width	-	RDB	250	-	-	ns
$t_{eshh}$	Select High pulse width	-	CSB	10	-	-	ns
$t_{rtd}$	Data output delay time	CL = 100pF	D7 to D0	-	-	200	ns
$t_{rth}$	Data output hold time	CL = 100pF	D7 to D0	5	-	-	ns

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

### 8.1 POWER ON / OFF SEQUENCE

To protect OLED panel and extend the panel life time, the driver IC power up/down routine should include a delay period between high voltage and low voltage power sources turn on/off.



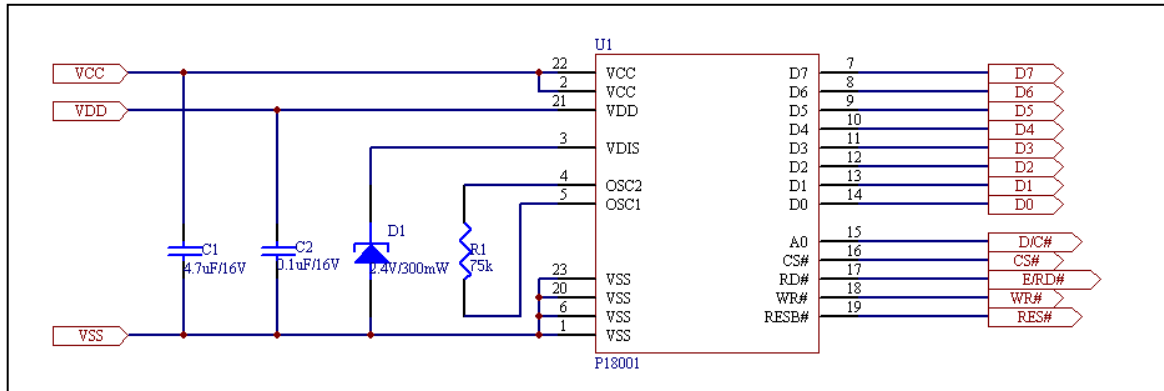
**Recommended power on/off timing**

	Min.	Typ.	Max.	Unit
A	2	5		ms
B	2	5		ms
C	2	5		ms
D	50	100		ms
E	2	5		ms
F	50	100		ms

**Notes 1:**User could initial the driver IC and clear RAM during the C & D period.

**Notes 2:**User should wait 2 ms for VDD stable then RESET the Driver IC in A period, the RESET time refer the driver IC datasheet is 1 us.

## 8.2 APPLICATION CIRCUIT



## 8.3 COMMAND TABLE

Refer to IC Spec.: LDS518 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.

### **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.





**11. PACKING SPECIFICATION**

	Revision	Date	Note
A1	2007/08/08	Packing Tray Instruction	

3008000092  
 Tray 330x270x8.7mm T=0.7mm, PS, P18001

①

3002000120  
 EPE COVER FOAM 269.6x225.9x1mm

②

Face down ; Rotate packing

9818001000  
 Module Assy For P18001  
 x56 pcs

③

④ 3010000002  
 5G 矽膠乾燥劑 x4 pcs

Tray =21 pcs  
 ⑩ 封箱膠帶 3208000125

⑤ 3003000012  
 真空包裝袋ONY/LDPE 480x285x90

⑥ 3003000016  
 Antistatic Bubble bag 440x(350+450)mm

⑦ 3001000005  
 Pizza Box 345x285x88, B浪

⑧ 3000000009  
 單色 Carton 385x305x203mm

⑨ 3006000000  
 Label x1 pcs

⑩ 封箱膠帶 3208000125

Rotate stack

⑩ 3006000000  
 Label x2 pcs

ITEM	PART No.	DESC	QTY
	9818001000	Module Assy For P18001	1
1	9818001000	Module Assy For P18001	2240
2	3008000092	Tray 330x270x8.7 T:0.7mm PS P18001	42
3	3002000120	EPE COVER FOAM 269.6x225.9x1 P18001	40
4	3010000002	5G 矽膠乾燥劑	8
5	3003000012	真空包裝袋ONY/LDPE 480x285x90	2
6	3003000016	Antistatic Bubble bag 440x(350+450)mm	2
7	3001000005	Pizza Box 345x285x88, B浪	2
8	3000000009	單色 Carton 385x305x203mm	1
9	3006000000	Label	3
10	3208000125	封箱膠帶, W=48mm, L=910cm	

CONFIDENTIAL		Scale	Unit	Sheet	PROJECT CODE
M.E.	E.E.	1:15	mm	1/1	P18001
Valerie Lo	Kevan Huang	Module	Spec.	Approved	PART NAME
		David Li	Tank Wang	Strong Tsai	Packing Tray Instruction
					PARTS NO.
					9918001000
					VERSION
					01
					VERSION
					01

**RITEK GROUP**  
**RiTdisplay Corporation**

## **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.

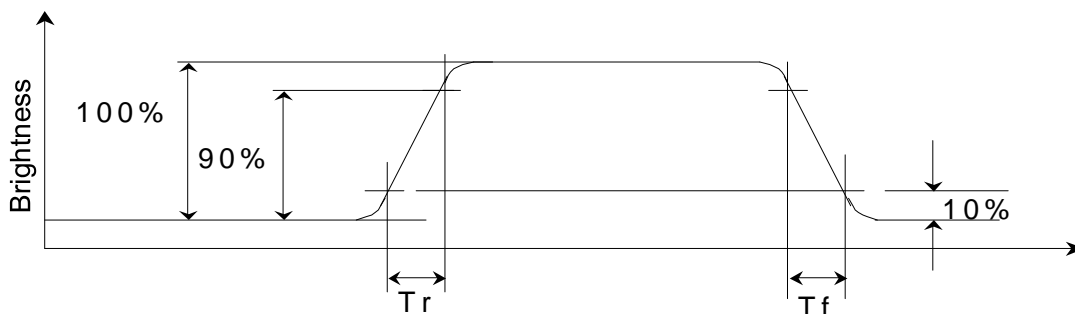
#### **B. DEFINITION OF CONTRAST RATIO**

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**

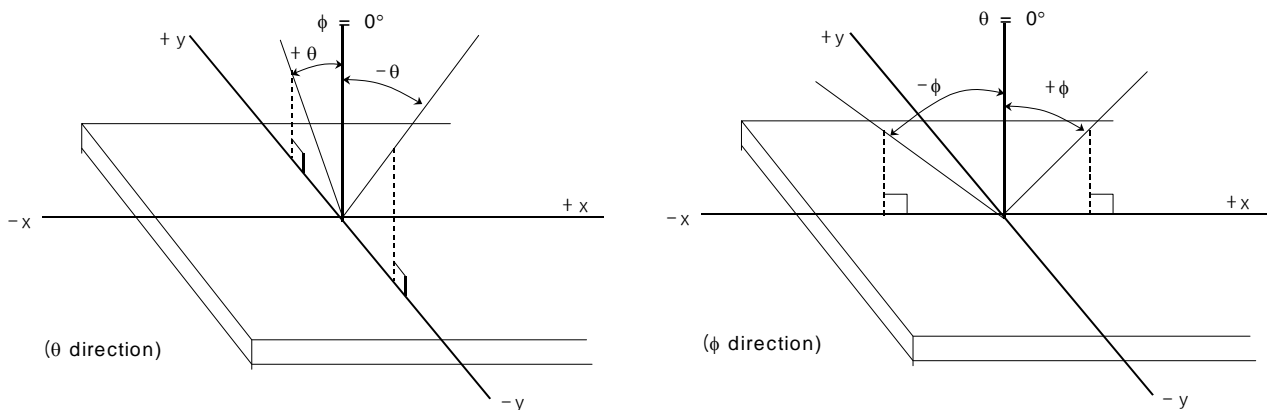
The definition of turn-on response time  $T_r$  is the time interval between a pixel reaching 10% of steady state luminance and 90% of steady state luminance. The definition of turn-off response time  $T_f$  is the time interval between a pixel reaching 90% of steady state luminance and 10% of steady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

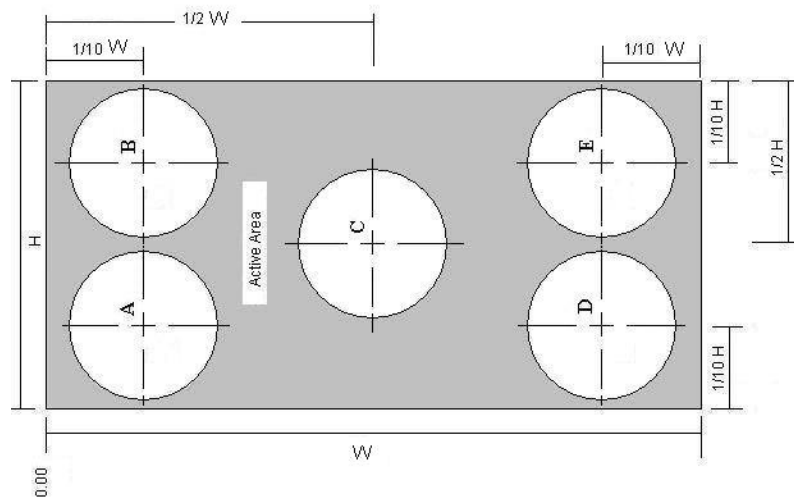
### E. DEFINITION OF LUMINANCE UNIFORMITY

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

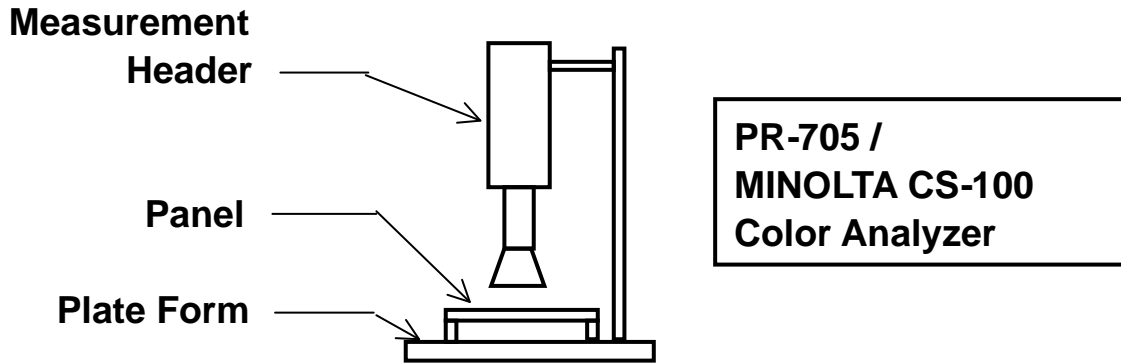


**Figure 4: Define the measurement points for luminance uniformity**

## APPENDIX 2: MEASUREMENT APPARATUS

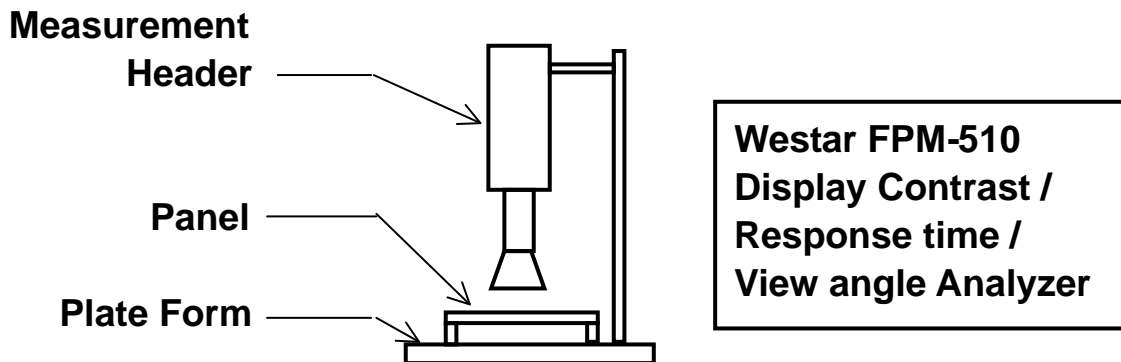
### A. LUMINANCE/COLOR COORDINATE

PHOTO RESEARCH PR-705, MINOLTA CS-100

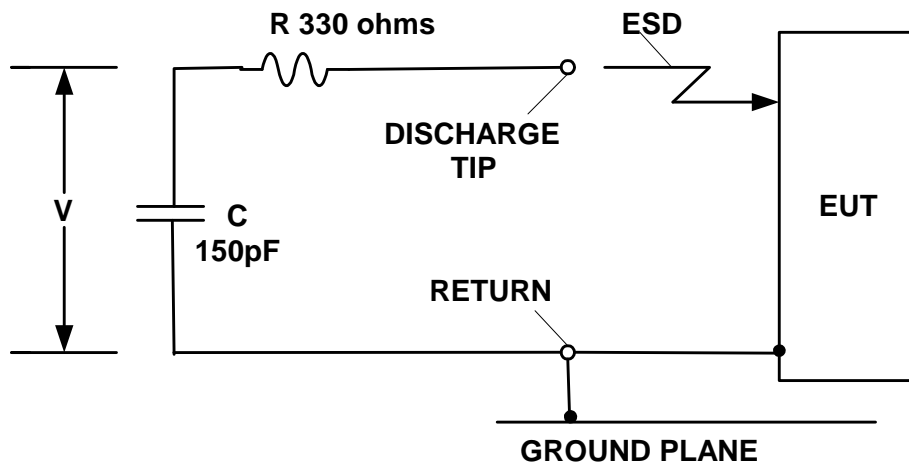


### B. CONTRAST / RESPONSE TIME / VIEW ANGLE

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.