AMOLED
Product Specification

Model Name: AHEM0 2 9 5 - 0 1

Description：2.95” 1080RGB x 1200 AMOLED

Version：1.0

Customer：

■ Approved for Preliminary Specification

☐ Approved for Final Specification

☐ Approved for Final Specification & Sample

Prepared	Checked	Approved
ANN	CS	

Customer’s Approval

Reversion History			
Reversion. No	Date	Contents	Remark

Contents

1 Scope

This Specification defines AMOLED manufactured by EverDisplay Optronics Limited, from here on refer as EDO. In the case of any unspecified item, it may require both EDO and the party designs this module into its product to work out a solution.

2 Features

2.1 Product Applications

Consumer Electronics

2.2 Product Features

1) Display color：16.7M (RGB x 8bits)
2) Display format：2.95” 1080 x 1200
3) Pixel arrangement：Sub Pixel Rendering
4) Interface：MIPI 4 lanes
5) Driver IC：RM 67295
6) Frequency: 60 Hz

3 Mechanical Specifications

Item	Specification	unit
Dimension outline	52.91 x 62.58 x 0.65 (Including Cushion)	mm
LTPS Glass outline	52.91 x 62.58	mm
Encapsulation Glass outline	52.91 x 59.58	mm
Resolution	1080(W) x 1200(H)	
Active area	50.11 x 55.68	mm
Diagonal size	2.95	inch
Pixel pitch	23.2 x 46.4	μm
Glass thickness （LTPS/encapsulation glass）	0.2 / 0.2	mm
Weight	10 (±10%, without FPC)	g

Note: Refer to **9 Outline Dimension Drawing**

4 Maximum Rating

Parameter	Symbol	Spec			Unit	Note
		Min.	Typ.	Max.		
Analog/boost power voltage	VCI	-0.3	-	5.5	V	–
VCI I/O voltage	VCI_IF	-0.3	-	5.5	V	–
I/O voltage	VDDI	-0.3	-	5.5	V	–
VSP voltage	VSP	-0.3	-	6.6	V	–
VPP(OTP power)	VPP(NC)	-	-	8.25	V	–
Operating temperature	Top	-40		85	℃	
Storage temperature	Tstg	-55		125	℃	

5 Electrical Specifications

5.1 Electrical Characteristics

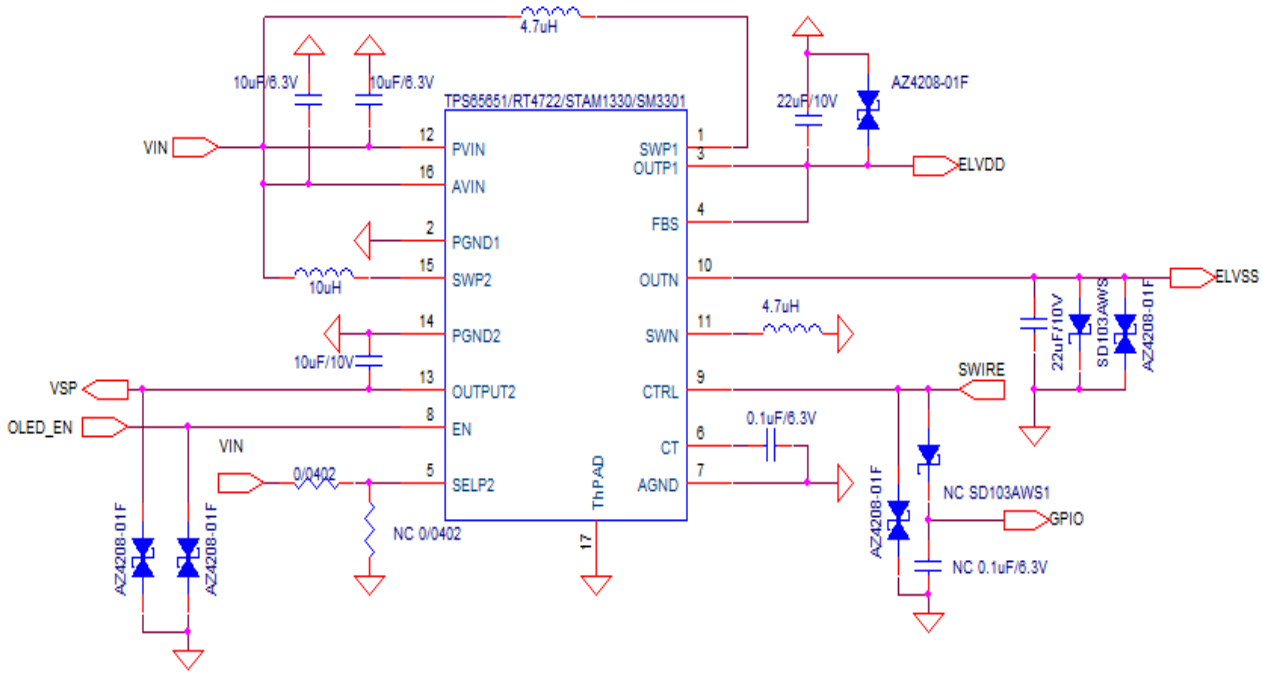
5.1.1 Power Characteristic：

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
AMOLED Power positive	ELVDD	-	4.6	-	V	
AMOLED power Negative	ELVSS	-	-2.5	-	V	Ref
Gamma Voltage	VSP	6.1	6.4	6.5	V	Ref
Digital Power supply	VDDI	1.65	1.8	3.6	V	Ref
Analog Power supply	VCI	2.5	3.3	4.8	V	Ref

Mode	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
@ Gray 255	IELVDD / IELVSS	VELVDD = 4.6V		45	25	mA	Ref
	IVCI	VELVSS =-2.5V		1.5	1.8	mA	Ref
	IVDDIO	VCI =3.3V		30	40	mA	Ref
	IVSP	VDDIO =1.8V VSP =6.4		12	15	mA	Ref

5.1.2 Power supply circuit application (This is for reference only)：

Power IC recommend: ST:STAM1330, Silicon Mitus:SM3301, Richtek:RT4722



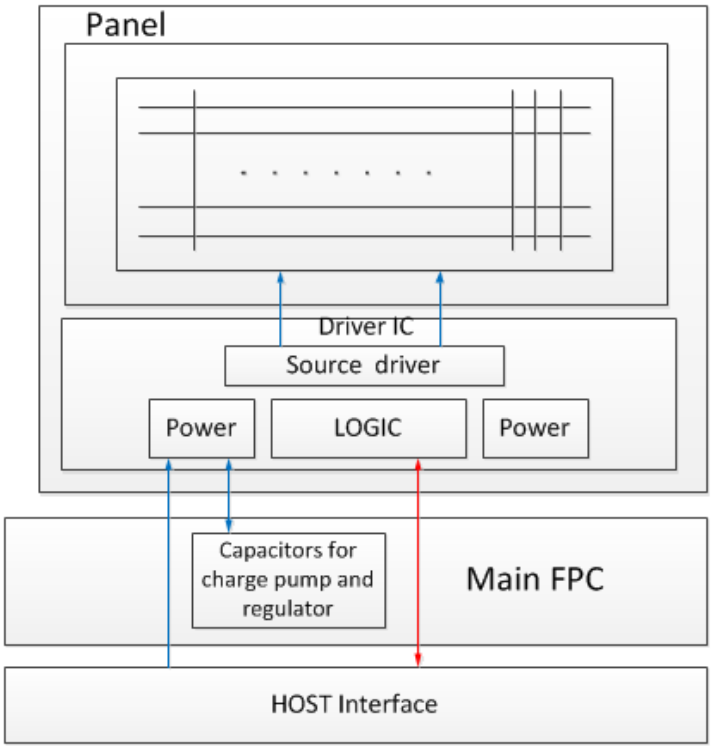
5.2 I/O Connection and Block Diagrams

5.2.1 I/O Connection

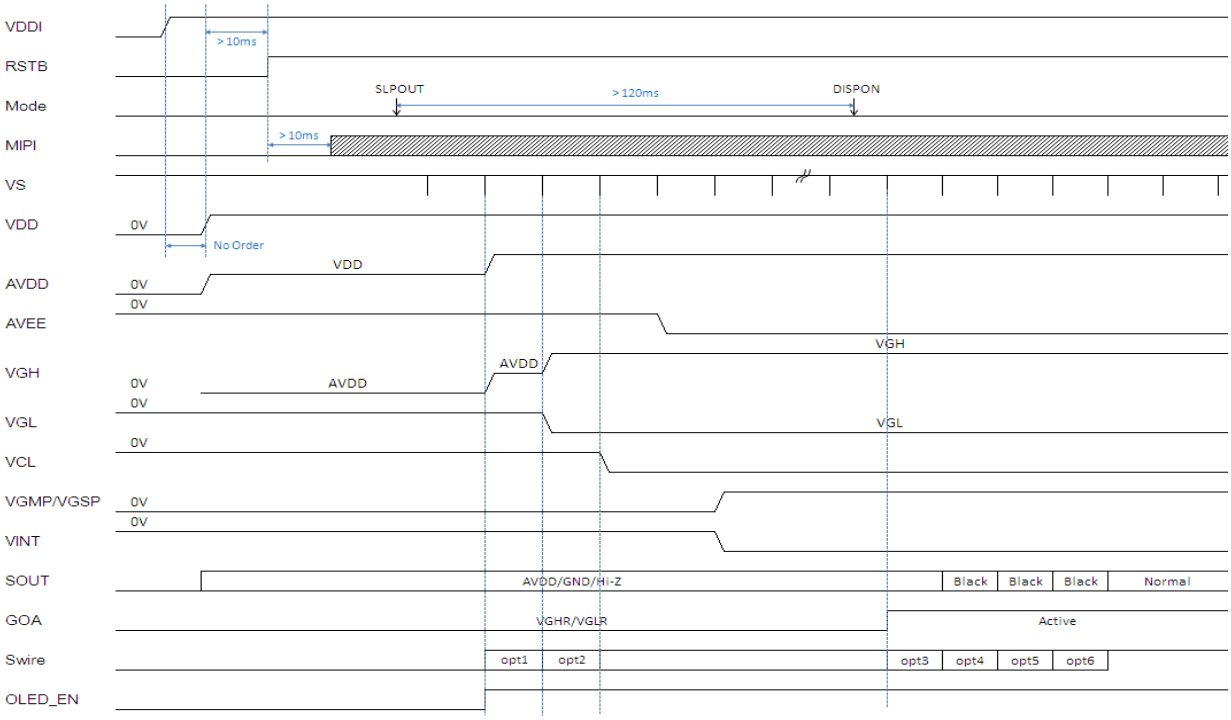
#	Pin Name	I/O	Description
1	ELVSS	Power	AMOLED power Negative
2	ELVSS	Power	AMOLED power Negative
3	ELVSS	Power	AMOLED power Negative
4	ELVDD	Power	AMOLED power Positive
5	ELVDD	Power	AMOLED power Positive
6	ELVDD	Power	AMOLED power Positive
7	GND	Power	The power ground
8	D2N	Power	MIPI DSI data2-
9	D2P	O	MIPI DSI data2+
10	GND	I	The power ground
11	D0N	O	MIPI DSI data0-
12	D0P	I	MIPI DSI data0+
13	GND	Power	The power ground
14	CLKN	Power	MIPI DSI clock-
15	CLKP	Power	MIPI DSI clock+
16	GND	I/O	The power ground
17	D1N	Power	MIPI DSI data1-

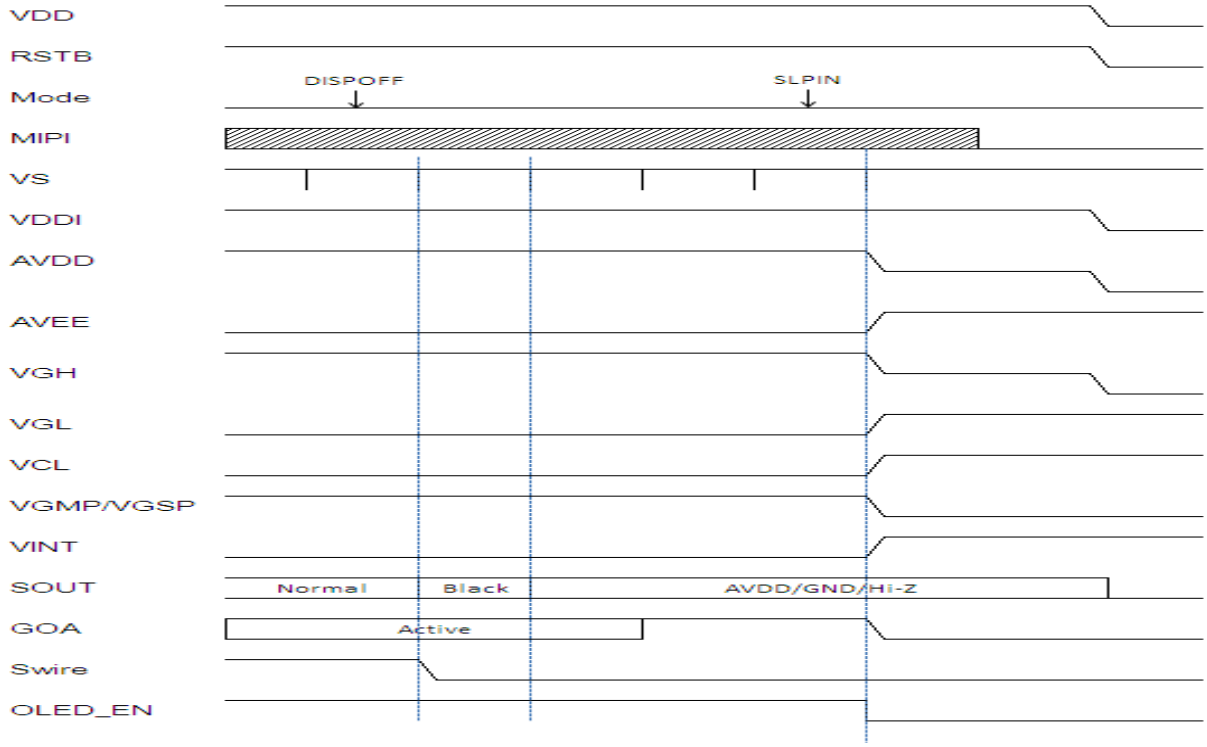
18	D1P	I/O	MIPI DSI data1
19	GND	I	The power ground
20	D3N	Power	MIPI DSI data3-
21	D3P	Power	MIPI DSI data3+
22	GND	Power	The power ground
23	VDDIO	I	Driver IC digital I/O supply
24	VDDIO	I	Driver IC digital I/O supply
25	VCI	Power	Driver IC analog supply
26	VCI	Power	Driver IC analog supply
27	RESX	I	This signal will reset the device and must be applied to properly initialize the chip. Active low.
28	SWIRE	O	Power IC control pin
29	OLED_EN	O	Power IC enable
30	MTP	Power	Power supply for OTP. Leave the pin to open when not in use.
31	GND	I/O	The power ground
32	VSP	Power	Power supply for Analog system
33	VSP	Power	Power supply for Analog system
34	ELVDD	Power	AMOLED power Positive
35	ELVDD	Power	AMOLED power Positive
36	ELVDD	Power	AMOLED power Positive
37	ELVSS	Power	AMOLED power Negative
38	ELVSS	Power	AMOLED power Negative
39	ELVSS	Power	AMOLED power Negative

5.2.2 Display Module Block Diagram



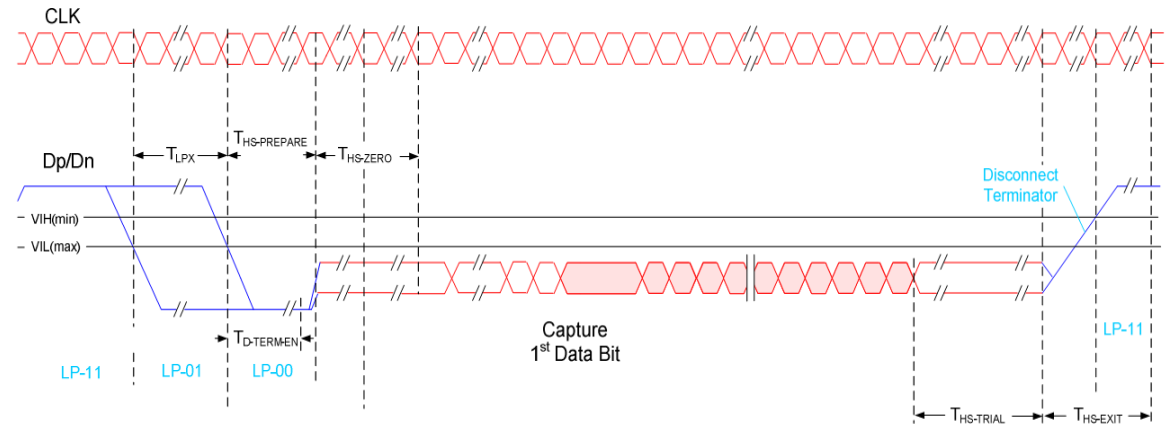
5.3 Recommended Operating Sequence



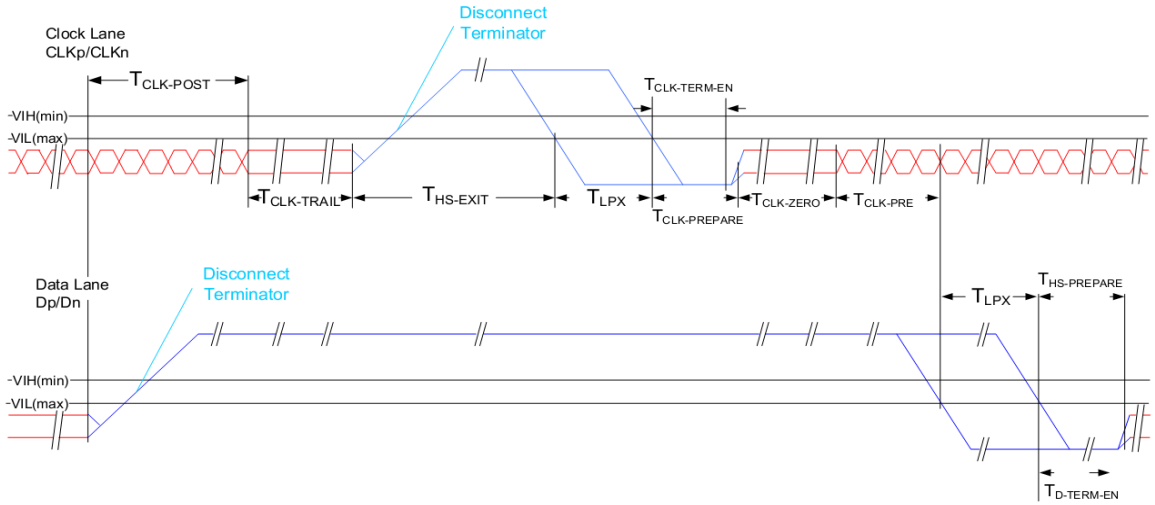


5.4 AC Characteristics（MIPI）

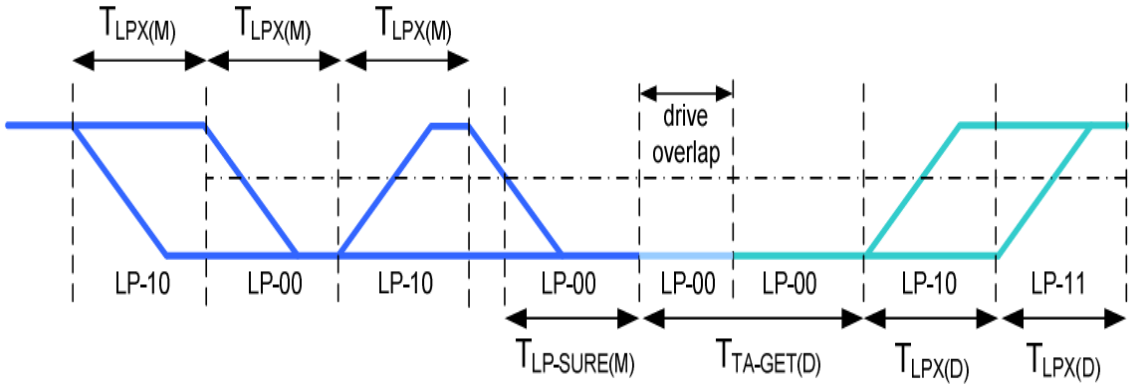
5.4.1 HS Data Transmission Burst



5.4.2 HS Clock Transmission



5.4.3 Turnaround Procedure



5.4.4 Timing Parameters

Parameter	Description	Min	Typ	Max	Unit
TCLK-POST	Time that the transmitter continues to send HS clock after the last associated Data Lane has transitioned to LP Mode. Interval is defined as the period from the end of THS-TRAIL to the beginning of TCLK-TRAIL.	60ns + 52*UI	-	-	ns
TCLK-TRAIL	Time that the transmitter drives the HS-0 state after the last payload clock bit of a HS transmission burst.	60	-	-	ns
THS-EXIT	Time that the transmitter drives LP-11 following a HS burst.	300	-	-	ns
TCLK-TERM-EN	Time for the Clock Lane receiver to enable the HS line termination, starting from the time point when Dn crosses VIL,MAX.	Time for Dn to reach VTERM-EN	-	38	ns
TCLK-PREPARE	Time that the transmitter drives the Clock Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission.	38	-	95	ns
TCLK-PRE	Time that the HS clock shall be driven by the transmitter prior to any associated Data Lane beginning the transition from LP to HS mode.	8	-	-	UI
TCLK-PREPARE + TCLK-ZERO	TCLK-PREPARE + time that the transmitter drives the HS-0 state prior to starting the Clock.	300	-	-	ns
TD-TERM-EN	Time for the Data Lane receiver to enable the HS line termination, starting from the time point when Dn crosses VIL,MAX .	Time for Dn to reach VTERM-EN	-	35 ns +4*UI	ns
THS-PREPARE	Time that the transmitter drives the Data Lane LP-00 Line state immediately before the HS-0 Line state starting the HS transmission	40ns + 4*UI	-	85 ns + 6*UI	ns
THS-PREPARE + THS-ZERO	THS-PREPARE + time that the transmitter drives the HS-0 state prior to transmitting the Sync sequence.	145ns + 10*UI	-	85ns+6* UI	ns
THS-TRAIL	Time that the transmitter drives the flipped differential state after last payload data bit of a HS transmission burst	60ns + 4*UI	-	-	ns

5.4.5 Timing requirements for RESETB

When RESETB of the reset pin equals to Low, it will be in the condition of reset.
When it is in the condition of reset, it will make the device recover the initial set.
However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not. The closed interval of Low can be shown as the following.

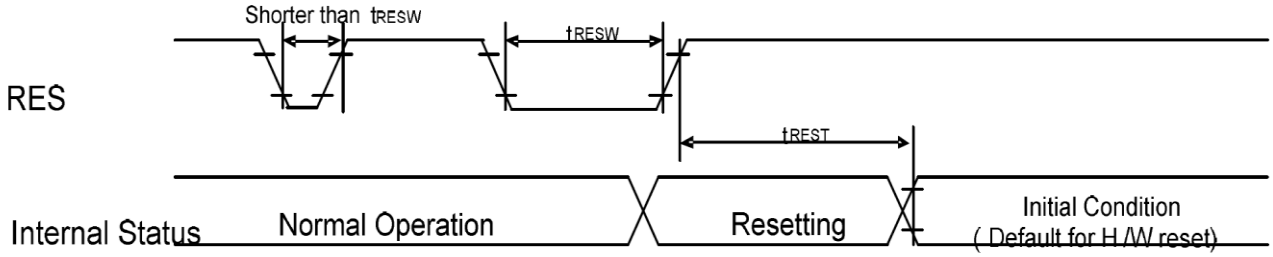


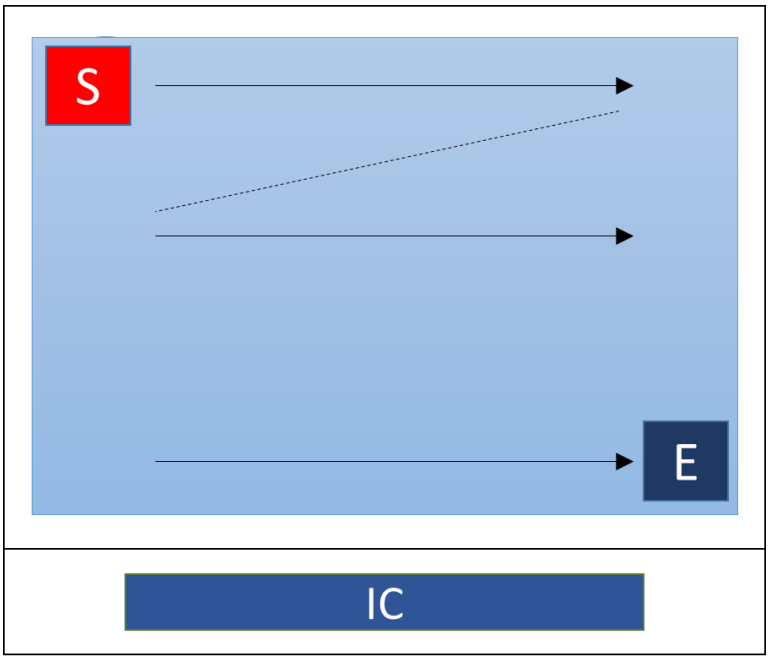
Figure: Reset timing

(Test condition: VDDIO=1.65V~3.6V, VSS=0V, T_A=-20℃~+85℃)

Symbol	Parameter	Related Pins	Spec			Note	Unit
			Min.	Typ.	Max.		
T_{RESW}	Reset low pulse width	RESX	10				us
T_{REST}	Reset complete time	-			5	When reset applied during Sleep *in* mode	ms
		-			120	When reset applied during Sleep *out* mode	ms

Table: Reset timing

5.5 Scan Direction



6 Electro-Optical Specification

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Remark
Brightness			Note1	270	300	330	cd/m^2	Note2
Brightness Uniformity				75		-	%	
Contrast Ratio		CR		10,000		-	-	
CIE Chromaticity	White	x	Normal to surface	(0.28)	(0.3)	(0.32)	-	
		y		(0.29)	(0.31)	(0.33)	-	
	Red	x		(0.63)	(0.66)	(0.69)	-	
		y		(0.31)	(0.34)	(0.37)	-	
	Green	x		(0.16)	(0.21)	(0.26)	-	
		y		(0.68)	(0.73)	(0.78)	-	
	Blue	x		(0.09)	(0.13)	(0.17)	-	
		y		(0.02)	(0.06)	(0.10)	-	
Color Gamut			vs. NTSC	80	105	-	%	
Viewing angle			U/D/L/R CR≥200		80	-	°	
Cross-talk			4% black or white window, 117 gray scale	-	-	5	%	Note3
Gamma			V(Gray)=48,72,104,132, 164,192,224,255	2.0	2.2	2.4	-	
Response time				-	-	2	ms	Note 4

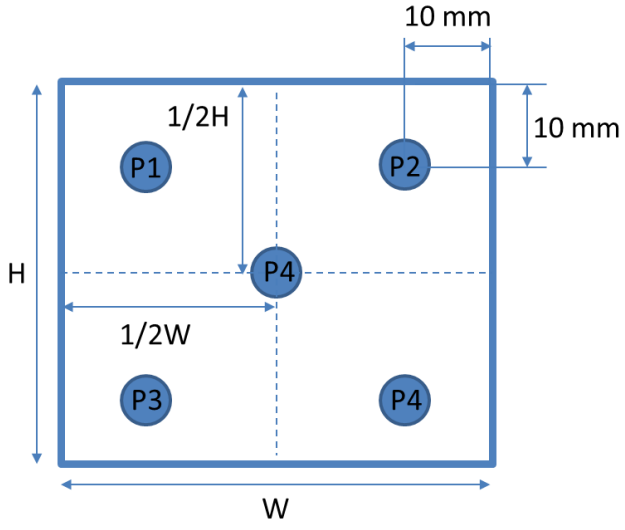
Note1: Temp.25℃，（Angle、distance）

Environmental conditions：Temp.25℃±3℃，65±20%RH，Dark Room。

Distance of OLED display center to measuring machine is 50cm。

Note2: Brightness, Brightness Uniformity and Contrast Ratio definition

Measure 5 points of Display Brightness. P1~P5.



1) Brightness definition

Luminance = [P1 + P2 + P3 + P4 + P5] / 5

2) Brightness Uniformity definition

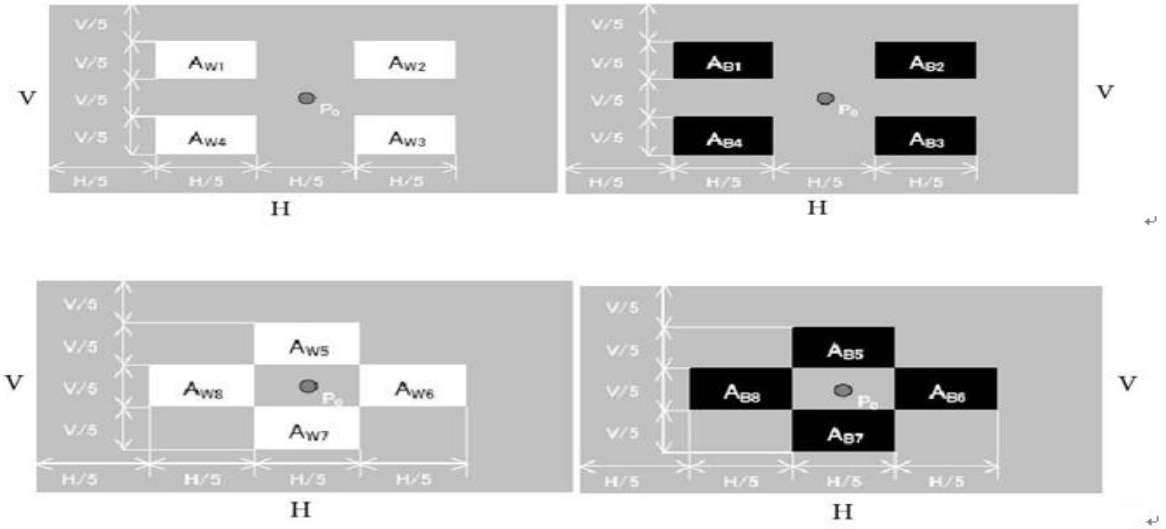
Brightness Uniformity = Y(min) / Y(max)

3) Contrast Ratio definition

Dark Room C.R= Luminance (White) / Luminance (Black)

Note3: Cross-talk

4% black or white window ， 117 gray background.



$$L_{W\_OFF} = \frac{L_{w1}+L_{w2}+L_{w3}+L_{w4}}{4} \quad L_{B\_OFF} = \frac{L_{B1}+L_{B2}+L_{B3}+L_{B4}}{4}$$

$$CT = \frac{\left|L_{Wi\_ON} - L_{W\_OFF}\right|}{L_{W\_OFF}} \times 100\%(i = 5\ to\ 8)$$

For white windows A_{Wi} (i = 5 to 8), and

$$CT = \frac{\left|L_{Bi\_ON} - L_{B\_OFF}\right|}{L_{B\_OFF}} \times 100\%(i = 5 \text{ to } 8)$$

For black windows A_{Bi} (i = 5 to 8).

The maximum cross-talk value shall be noted in the measurement report.

Note4: Response Time

Response time=Pixel turn on and turn off time (White<=>Black).

It is measuring transition time from 10% to 90% of luminance.

7 Reliability

7.1 Environmental Test

No	Item	Conditions(Note1)
1	High Temperature Operation	60℃ / 128 hours
2	High Temperature non-Operation	70℃ / 128 hours
3	Low Temperature Operation	-20℃ / 128 hours
4	Low Temperature non-Operation	-30℃ / 128 hours

7.2 Electrical Test

No	Item	Conditions
1	Air discharge	±4KV,150PF/330Ω (Module level)
2	Contact discharge	±3KV, 150PF/330Ω (Module level)

8 Outline Dimension Drawing