

SPECIFICATION FOR AMOLED Module

MODULE No:	ID-151WQOEN001-C0000
CUSTOMER:	

I-DISPLAY	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

Revision History

[illegible]

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* **Description**

This is a color active matrix AMOLED module using Low Temperature Poly-silicon Thin Film Transistors as active switching devices. This module has a 15.05 inch diagonally measured active area with 2560horizontal by 1600vertical pixel arrays. Each pixel is divided into RED and GREEN dots, or BLUE and GREEN dots, and two pixels share RED or BLUE dots which are arranged in vertical stripe and this module can display RGB 8 bit colors.

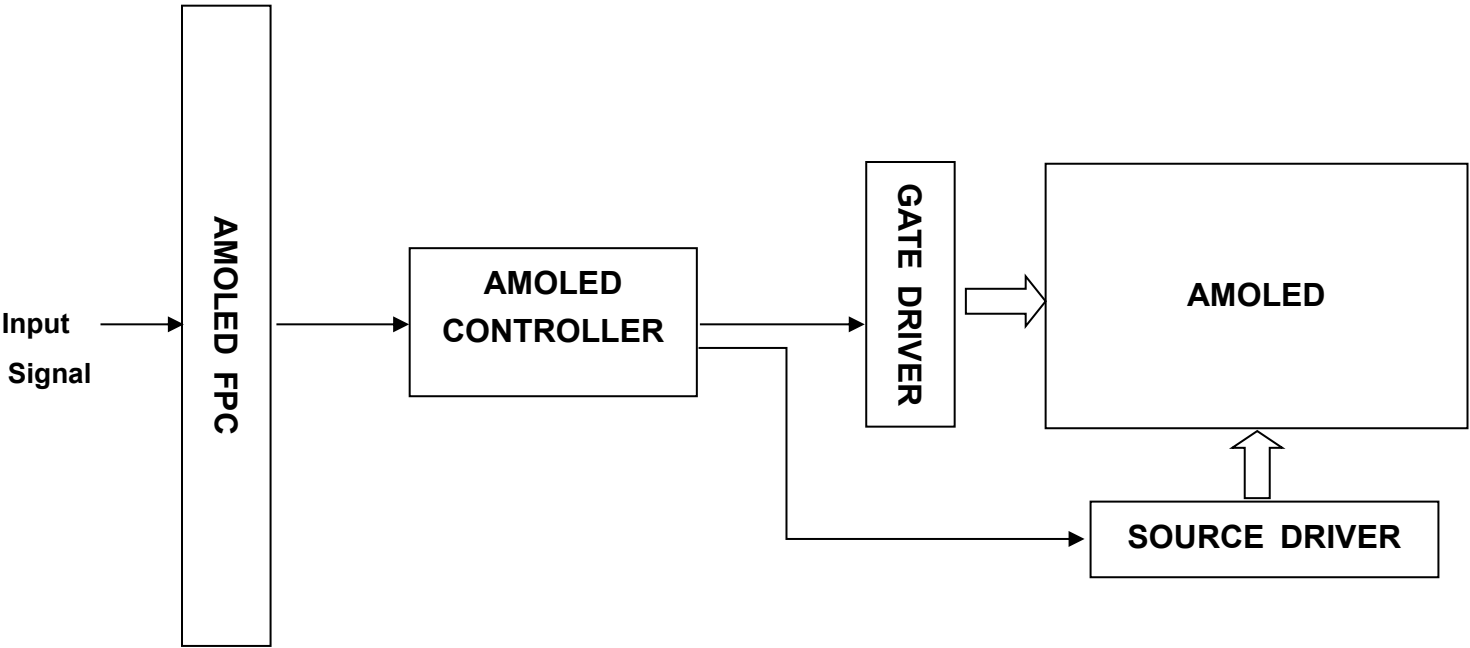
* **Features**

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	324.096(H)*202.56(V) (15.05 inch)	mm	
Driver element	TFT active matrix	-	
Display colors	RGB 8 bit	colors	
Number of pixels	2560(RGB)*1600	dots	
Pixel arrangement	Real RGB arrangement	-	
Pixel pitch	0.1266	mm	
Viewing angle	ALL	o'clock	
Controller IC	RM98121	-	
LCM Interface	EDP 1.2	-	
Display mode	AMOLED	-	
Touch technology	On Cell (RX-60,TX-37)		
Operating temperature	-40~+85	℃	
Storage temperature	-40~+90	℃	

* **Mechanical Information**

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		328.896		mm	-
	Vertical(V)		210.46		mm	-
	Depth(D)		1.296		mm	-
Weight			TBD		g	-

1. Block Diagram



3. Input terminal Pin Assignment

Connector Type:CN5(9827S-60J09-GFN4)

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground	P
2	GND	Ground	I
3	GND	Ground	I
4	M_AUX_N	eDP Signal	P
5	GND	Ground	I
6	M_AUX_P	eDP Signal	I
7	GND	Ground	P
8	GND	Ground	I
9	GND	Ground	I
10	M_D0P	eDP Signal	P
11	GND	Ground	I
12	M_D0N	eDP Signal	I
13	GND	Ground	P
14	GND	Ground	I
15	GND	Ground	I
16	M_D1P	eDP Signal	P
17	NC	Do not used	I
18	M_D1N	eDP Signal	I
19	VCC	Power	
20	GND	Ground	--
21	VCC	Power	
22	M_D2P	eDP Signal	
23	VCC	Power	
24	M_D2N	eDP Signal	
25	VCC	Power	
26	GND	Ground	

27	NC	Do not used	
28	M_D3P	eDP Signal	
29	VDD	Power	--
30	M_D3N	eDP Signal	--
31	VDD	Power	--
32	GND	Ground	--
33	VDD	Power	--
34	HPD	HPD signal output	P
35	VDD	Power	
36	PWMI_IN	PWM signal input	
37	VDD	Power	
38	GND	Ground	--
39	VDD	Power	P
40	NC	Do not used	P
41	NC	Do not used	P
42	NC	Do not used	P
43	CTP_ERROR	Touch Panel Signal	--
44	NC	Do not used	P
45	CTP_RESET	Touch Panel Signal	P
46	NC	Do not used	P
47	CTP_INT	Touch Panel Signal	P
48	NC	Do not used	P
49	PW_RESET	Touch Panel Signal	P
50	NC	Do not used	P
51	CTP_SCL	Touch Panel Signal	--
52	NC	Do not used	--
53	CTP_SDA	Touch Panel Signal	P
54	NC	Do not used	P

55	LS_INT	Touch Panel Signal	P
56	NC	Do not used	P
57	Thermistor_T	Touch Panel Signal	P
58	NC	Do not used	P
59	Thermistor_S	Touch Panel Signal	P
60	NC	Do not used	P

TP(Connector Type:J1(FH28K-68S-0.5SH))

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground	P
2	GND	Ground	I
3	GND	Ground	I
4	GND	Ground	P
5	RX1	TP Signal	I
6	RX2	TP Signal	I
7	RX3	TP Signal	P
8	RX4	TP Signal	I
9	RX5	TP Signal	I
10	RX6	TP Signal	P
11	RX7	TP Signal	I
12	RX8	TP Signal	I
13	RX9	TP Signal	P
14	RX10	TP Signal	I
15	RX11	TP Signal	I
16	RX12	TP Signal	P
17	RX13	TP Signal	I
18	RX14	TP Signal	I
19	RX15	TP Signal	

20	RX16	TP Signal	--
21	RX17	TP Signal	
22	RX18	TP Signal	
23	RX19	TP Signal	
24	RX20	TP Signal	
25	RX21	TP Signal	
26	RX22	TP Signal	
27	RX23	TP Signal	
28	RX24	TP Signal	
29	RX25	TP Signal	--
30	RX26	TP Signal	--
31	RX27	TP Signal	--
32	RX28	TP Signal	--
33	RX29	TP Signal	--
34	RX30	TP Signal	P
35	RX31	TP Signal	
36	RX32	TP Signal	
37	RX33	TP Signal	
38	RX34	TP Signal	--
39	RX35	TP Signal	P
40	RX36	TP Signal	P
41	RX37	TP Signal	P
42	RX38	TP Signal	P
43	RX39	TP Signal	--
44	RX40	TP Signal	P
45	RX41	TP Signal	P
46	RX42	TP Signal	P
47	RX43	TP Signal	P

48	RX44	TP Signal	P
49	RX45	TP Signal	P
50	RX46	TP Signal	P
51	RX47	TP Signal	--
52	RX48	TP Signal	--
53	RX49	TP Signal	P
54	RX50	TP Signal	P
55	RX51	TP Signal	P
56	RX52	TP Signal	P
57	RX53	TP Signal	P
58	RX54	TP Signal	P
59	RX55	TP Signal	P
60	RX56	TP Signal	P
61	RX57	TP Signal	P
62	RX58	TP Signal	P
63	RX59	TP Signal	P
64	RX60	TP Signal	P
65	GND	Ground	P
66	GND	Ground	P
67	GND	Ground	P
68	GND	Ground	P

Connector Type:J2(FH28K-68S-0.5SH)

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground	P
2	GND	Ground	I
3	GND	Ground	I

4	GND	Ground	P
5	TX1	TP Signal	I
6	TX2	TP Signal	I
7	TX3	TP Signal	P
8	TX4	TP Signal	I
9	TX5	TP Signal	I
10	TX6	TP Signal	P
11	TX7	TP Signal	I
12	TX8	TP Signal	I
13	TX9	TP Signal	P
14	TX10	TP Signal	I
15	TX11	TP Signal	I
16	TX12	TP Signal	P
17	TX13	TP Signal	I
18	TX14	TP Signal	I
19	TX15	TP Signal	
20	TX16	TP Signal	--
21	TX17	TP Signal	
22	TX18	TP Signal	
23	TX19	TP Signal	
24	TX20	TP Signal	
25	TX21	TP Signal	
26	TX22	TP Signal	
27	TX23	TP Signal	
28	TX24	TP Signal	
29	TX25	TP Signal	--
30	TX26	TP Signal	--
31	TX27	TP Signal	--

32	TX28	TP Signal	--
33	TX29	TP Signal	--
34	TX30	TP Signal	P
35	GND	Ground	
36	GND	Ground	
37	TX31	TP Signal	
38	TX32	TP Signal	--
39	TX33	TP Signal	P
40	TX34	TP Signal	P
41	TX35	TP Signal	P
42	TX36	TP Signal	P
43	TX37	TP Signal	--
44	GND	Ground	P
45	GND	Ground	P
46	RX1	TP Signal	P
47	RX2	TP Signal	P
48	RX3	TP Signal	P
49	RX4	TP Signal	P
50	RX5	TP Signal	P
51	RX6	TP Signal	--
52	RX7	TP Signal	--
53	RX8	TP Signal	P
54	RX9	TP Signal	P
55	RX10	TP Signal	P
56	RX11	TP Signal	P
57	RX12	TP Signal	P
58	RX13	TP Signal	P
59	RX14	TP Signal	P

60	RX15	TP Signal	P
61	RX16	TP Signal	P
62	RX17	TP Signal	P
63	RX18	TP Signal	P
64	RX19	TP Signal	P
65	RX20	TP Signal	P
66	RX21	TP Signal	P
67	RX22	TP Signal	P
68	RX23	TP Signal	P
69	RX24	TP Signal	
70	RX25	TP Signal	
71	RX26	TP Signal	
72	RX27	TP Signal	
73	RX28	TP Signal	
74	RX29	TP Signal	
75	RX30	TP Signal	
76	GND	Ground	
77	GND	Ground	
78	GND	Ground	
79	GND	Ground	
80	NC	Do not used	

Connector Type:J3(FH28K-68S-0.5SH)

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground	P
2	GND	Ground	I
3	GND	Ground	I

4	GND	Ground	P
5	RX31	TP Signal	I
6	RX32	TP Signal	I
7	RX33	TP Signal	P
8	RX34	TP Signal	I
9	RX35	TP Signal	I
10	RX36	TP Signal	P
11	RX37	TP Signal	I
12	RX38	TP Signal	I
13	RX39	TP Signal	P
14	RX40	TP Signal	I
15	RX41	TP Signal	I
16	RX42	TP Signal	P
17	RX43	TP Signal	I
18	RX44	TP Signal	I
19	RX45	TP Signal	
20	RX46	TP Signal	--
21	RX47	TP Signal	
22	RX48	TP Signal	
23	RX49	TP Signal	
24	RX50	TP Signal	
25	RX51	TP Signal	
26	RX52	TP Signal	
27	RX53	TP Signal	
28	RX54	TP Signal	
29	RX55	TP Signal	--
30	RX56	TP Signal	--
31	RX57	TP Signal	--

32	RX58	TP Signal	--
33	RX59	TP Signal	--
34	RX60	TP Signal	P
35	GND	Ground	
36	GND	Ground	
37	TX37	TP Signal	
38	TX36	TP Signal	--
39	TX35	TP Signal	P
40	TX34	TP Signal	P
41	TX33	TP Signal	P
42	TX32	TP Signal	P
43	TX31	TP Signal	--
44	GND	Ground	P
45	GND	Ground	P
46	TX30	TP Signal	P
47	TX29	TP Signal	P
48	TX28	TP Signal	P
49	TX27	TP Signal	P
50	TX26	TP Signal	P
51	TX25	TP Signal	--
52	TX24	TP Signal	--
53	TX23	TP Signal	P
54	TX22	TP Signal	P
55	TX21	TP Signal	P
56	TX20	TP Signal	P
57	TX19	TP Signal	P
58	TX18	TP Signal	P
59	TX17	TP Signal	P

60	TX16	TP Signal	P
61	TX15	TP Signal	P
62	TX14	TP Signal	P
63	TX13	TP Signal	P
64	TX12	TP Signal	P
65	TX11	TP Signal	P
66	TX10	TP Signal	P
67	TX9	TP Signal	P
68	TX8	TP Signal	P
69	TX7	TP Signal	
70	TX6	TP Signal	
71	TX5	TP Signal	
72	TX4	TP Signal	
73	TX3	TP Signal	
74	TX2	TP Signal	
75	TX1	TP Signal	
76	GND	Ground	
77	GND	Ground	
78	GND	Ground	
79	GND	Ground	
80	NC	Do not used	

TP SENSOR

Item	Item	Specification	Description	Remark
1	Middle Pitch	≤ 6mm	Be suitable for X-direction and Y-direction	
2	Trace design	Need double routing	Tx double routing, Rx double routing	For Rigid OLED oncell
3	Max ITO Resistance	Long: ≤ 20KΩ Short: ≤ 15KΩ	1, The Maximum ITO resistance 2, Long ITO and Short ITO has different spec	For Rigid OLED oncell

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4. AMOLED Optical Characteristics

4.1 Optical specification

Item		Symbol	Conditio	Min.	Typ.	Max.	Unit.	Note	
Contrast Ratio		CR	Θ=0	5000	--	--		(1)(2)	
Response time			25℃	--	3		msec	(1)(3)	
			-20℃	--	4				
LCM Luminance		LV		720	800	880	cd/m2		
Color gamut		S(%)		100	105	--	%	(1)	
Color Filter Chromacicity	White	W _X		0.305	0.313	0.321		(1)(4)	
		W _Y		0.321	0.329	0.337			
	Red	R _X		0.661	0.681	0.70			
		R _Y		0.298	0.318	0.338			
	Green	G _X		0.190	0.230	0.270			
		G _Y		0.685	0.725	0.765			
	Blue	B _X		0.119	0.139	0.159			
		B _Y		0.024	0.044	0.064			
Viewing angle	Hor.	Θ _L	CR>10	--	85	--		(1)(4)	
		Θ _R		--	85	--			
	Ver.	Θ _U		--	85	--			
		Θ _D		--	85	--			
OLED Life Time			T80@25	20000	30000	--	Hrs		
			T80@85	1200			Hrs		
Option View Direction		ALL							(5)

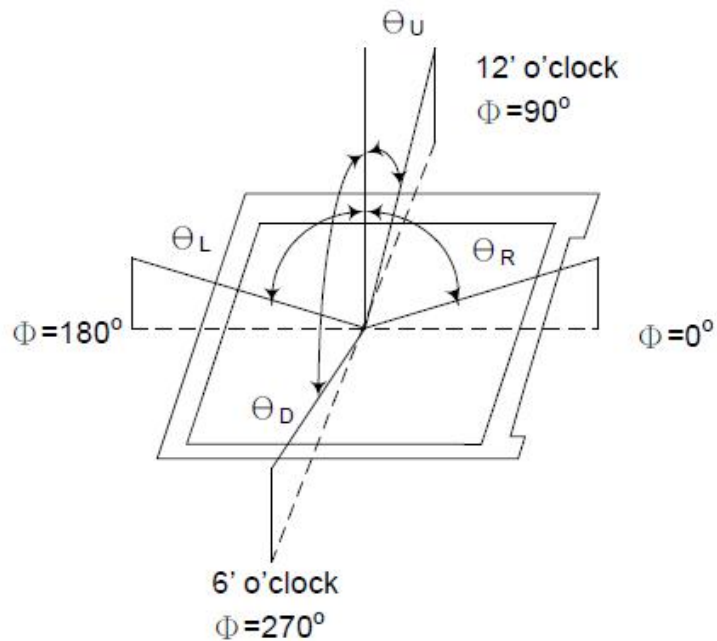
Note 1: Brightness

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

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

Method : Turn the machine around H direction, and measure the brightness of the middle of the panel.

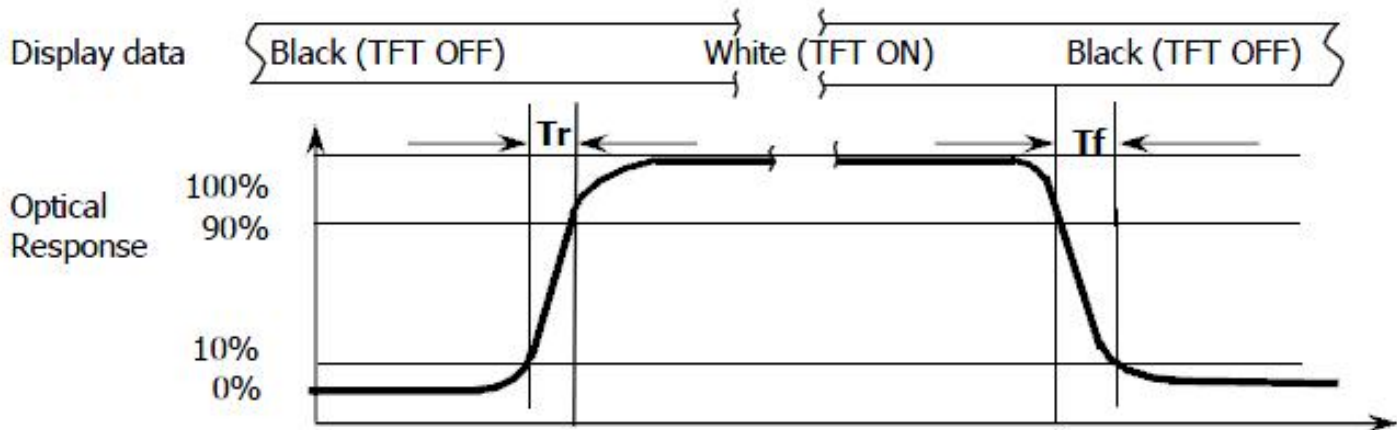
Note (1): Definition of Viewing Angle :



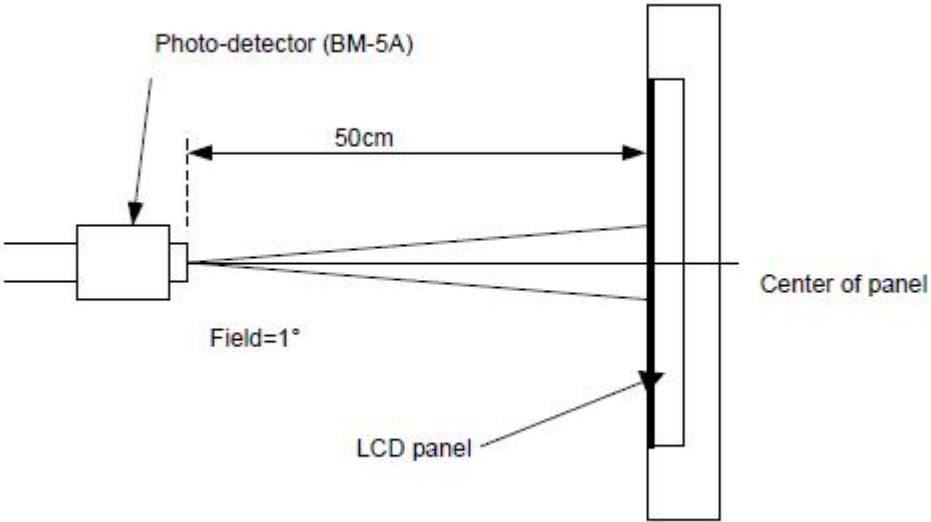
Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3): Response Time



Note (4): Definition of optical measurement setup



5. AMOLED Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25 VSS=0V)

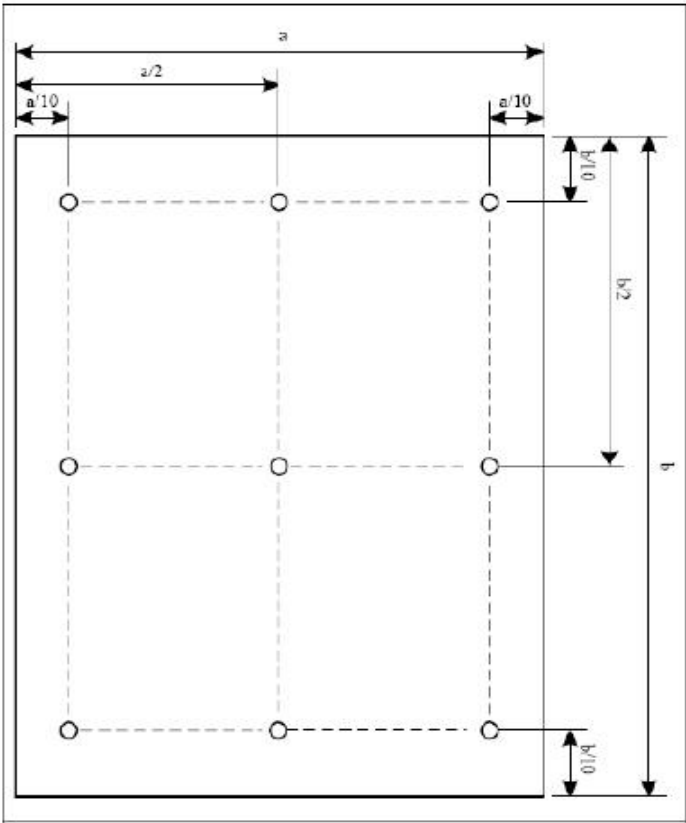
Characteristics		Symbol	Min.	Max.	Unit
Supply Voltage	System	VCC	-0.3	4.6	V
	EL Power	VDD	-0.3	24	V
Operating temperature		T _{OP}	-40	+85	°C
Storage temperature		T _{ST}	-40	+90	°C

NOTE: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics		Symbol	Min.	Typ.	Max.	Unit	Note
System	Analog/ Logic Vol.	VCC	3	3.3	3.6	V	--
Panel	Analog Vol.	VDD	19	20	24	V	--
Current	Logic	Ivcc		500	700	V	--
	Panel	Ivdd	--	1300	1600	mA	--
Consumption	Logic	Pvcc		1.65	2.31	V	--
	Panel	Pvdd		26	32	V	--
Frame Frequency		fps	--	60	--	Hz	

NOTE 3: Luminance Uniformity of these 9 points is defined as below:



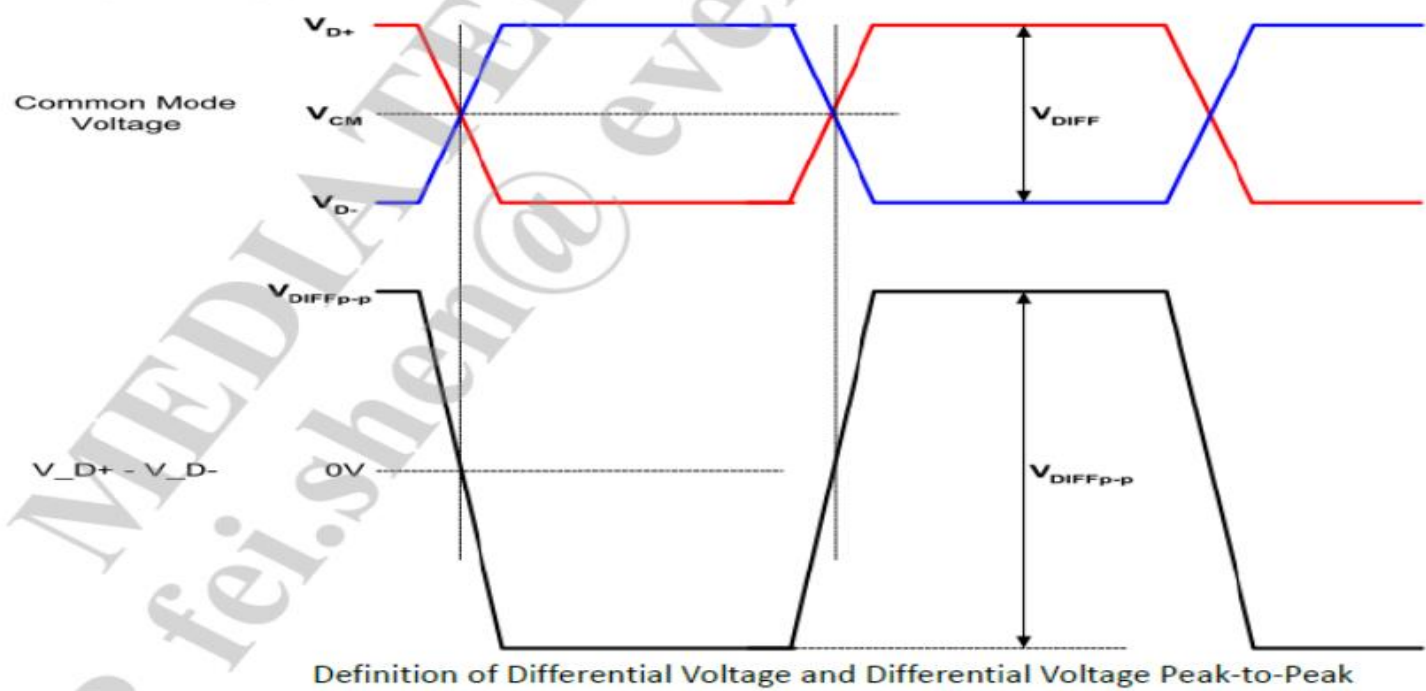
$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

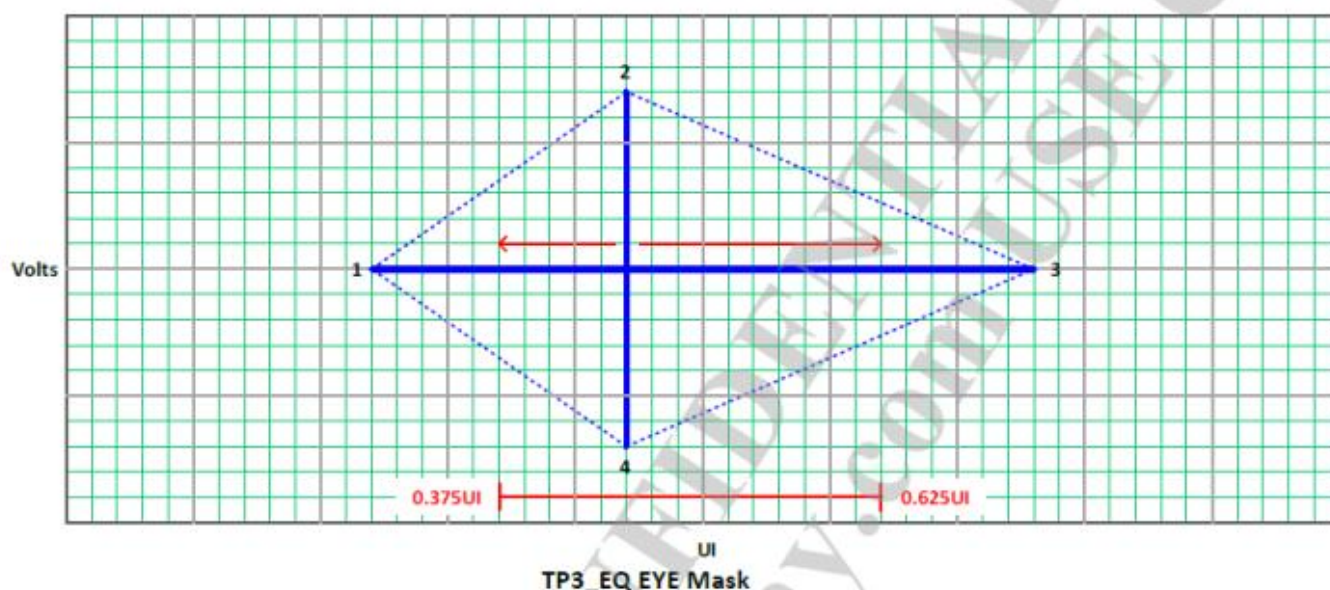
$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

6. AMOLED AC Characteristic

6.1 EDP Characteristic

DC Specification	Min	Typ	Max	Unit
DC common mode voltage	0		2	V
AC Specification	Min	Typ	Max	Unit
Frequency for high bit rate 3	8.05707	8.1	8.10243	Gbps
Frequency for high bit rate 2	5.37138	5.4	5.40162	Gbps
Frequency for high bit rate	2.68569	2.7	2.70081	Gbps
Frequency for reduced bit rate	1.611414	1.62	1.620486	Gbps
Spread spectrum clock (down spreading)	0		0.5	%
SSC modulation frequency	30		33	kHz
Differential peak-to-peak input voltage at package pins	100	-	1320	mV
Rx input DC common mode voltage	0	-	2	V
Differential termination resistance	80	-	120	ohm
Single-ended termination resistance	40	-	60	ohm
Rx short circuit current limit	-	-	50	mA
RX intra-pair skew tolerance at HBR3	-	-	50	ps





Eye Mask at receiver package pin for HBR3/HBR2/HBR

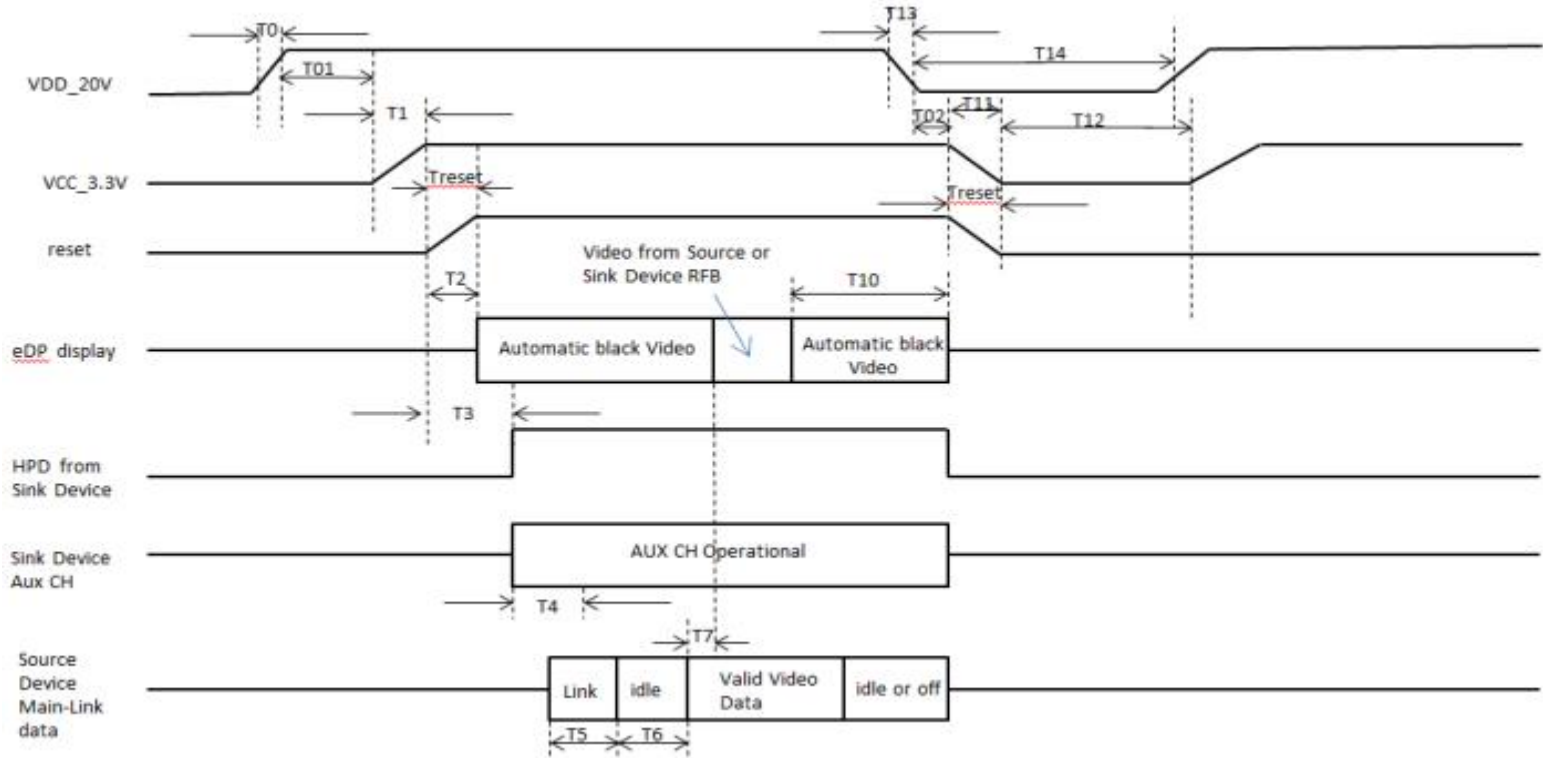
Point	Time(UI)	Voltage
1	Any UI location (x), where the EYE width is open from x to x+0.5UI	0
2	Any Passing UI location between 0.375 and 0.625UI	0.07
3	Point 1 + 0.5UI	0
4	Same as point 2	-0.07

Resolution	2560(H) × 1600(V)	
eDP Speed	Typ	5.4 Gbps
Frame Freq.	Typ	60 Hz

Porch 信息

	Horizontal	Vertical
Active	2560	1600
Blanking(total)	160	32
FP	48	3
Sync	32	5
BP	80	24

6.2 Recommended Operating Sequence



Timing Parameter	Description	Required By	Min Limit (ms)	Max Limit (ms)	Notes
T1	Power rail rise time, 10 to 90%	Source Device	0.5	10	
T2	Delay from LCDVCC to automatic Black Video generation	Sink Device	0	80	Automatic Black Video generation prevents display noise until valid video data is received from the Source device. ^{a, b}
T3	Delay from LCDVCC to HPD high	Sink Device	0	80	Sink device AUX CH must be operational upon HPD high. ^c
T4	Delay from HPD high to Link Training initialization	Source Device	–	–	Allows for the Source device to read Link capability and initialize.
T5	Link Training duration	Source Device	–	–	Dependent on the Source device Link Training protocol.
T6	Link idle	Source Device	–	–	Min value accounts for required BS symbol sequence-Idle Pattern. Max value allows for Source device frame synchronization.
T7	Delay from valid video data from Source device to video on display	Sink Device	0	50	Max value allows for the Sink device to validate video data and timing. At the end of T7, the Sink device will indicate that it detected valid video data, by setting the RECEIVE_PORT_0_STATUS bit(s) in the SINK_STATUS register(s) (DPCD Address(es) 00205h and 0200Fh, bit 0; see DP v1.3) to logic 1, and the Sink device will no longer generate automatic Black Video.

T10	Delay from end of valid video data from the Source device to power-off	Source Device	0	500	
T11	Power rail fall time, 90 to 10%	Source Device	–	10	
T12	Power-off time	Source Device	500	–	LCDVCC may start to rise again immediately after the minimum T12 time, as illustrated in Figure 11-1 and Figure 11-2 .
T0	Power rail raise time, 10 to 90%	Source Device	0.5	10	
T01	Delay from VDD_20V	Source Device	0	±20	
T02	Delay from VDD_20V	Source Device	0	±20	
T13	Power rail fall time, 90 to 10%	Source Device		20	
T14	Power-off time	Source Device	900	-	
T reset	T-CON reset time		>0		前端可不给

eDP AUX dimming

Address	Value(HEX)	Luminance
354/355h	0-2EE	0-750

PWM 调光

Dimming via CN5 36PIN. The recommended cycle frequency is 200Hz-10khz

7. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	85°C,96H	
Low Temperature Operating	-40°C, 96HR	
High Temperature Storage	90°C, 96HR	
Low Temperature Storage	-40°C, 96HR	
High Temperature & High Humidity Storage	+60°C, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-40°C,30 min ↔ 85°C,30 min, Change time:5min 20CYC.	
ESD test	Non-operation (W/cG, 9 points in AA, to AA edge 8mm): Contact:C=100pF,R=1.5kΩ,+4KV/±6KV/+8KV Air:C=100pF,R=1.5k2,+8KV/+10KV	
	Operation (W/cG, 9 points in AA, to AA edge 8mm): Contact:C=150pF R=330Q.±4KV/+6KV Air:C=150pF,R=3300,+10KV	
Vibration (Non-operation)	5Hz to 200Hz logarithm sweep for 20 min/cycle 5Hz to 12.2Hz:The amplitude is 10mmp-p 12.2Hz to 100Hz : The acceleration is 3.0G 0-pk	No broken No crack No frit peeling
Box Drop Test	0.8m free drop, 1 corner,3 edges and 6 sides	No Function Defect No broken on the surface of the packing box.

8. Cautions and Handling Precautions

- (1) When cleaning ITO pad, avoid using hard and abrasive material or corrosive solution.
- (2) Keep module away from direct sunlight or fluorescent light, and keep it at room temperature and humidity.
- (3) Strong impact & pressure on module and packing is prohibited.
- (4) Following normal power on/off sequence is necessaryfor preventing abnormal display or permanent damage to display.
- (5) Optimal contrast ratio under ideal voltage is AMOLED module's characteristic, hence it is recommended a voltage control function available.
- (6) Image sticking may occur if an image displays for an extended period of time.
- (7) When interfered by system's overall mechanical design, an abnormal display may occur.
- (8) After considering emitting energy, you should plan your design to satisfy EMI standards.
- (9) Host side should place a surge-prevent circuit at power trace (ie: VCI, Vddi) to protect AMOLEDmodule.

9. Packing

----TBD-----