SAMSUNG
MOBILE DISPLAY

LEAD-FREE

Date : OCT. 27th, 2011

Specification for Approval

Product Name : AMOLED Module

Model Name : AMS326PM01

Description : 3.26" Visual WVGA(854×480) 16M Colors

Proposed by			Customer's Approval
Designed	Checked	Approved	
Jae Young Oh	Eun Jung Oh	Eui Soon Lee	

SAMSUNG
MOBILE DISPLAY

Revision History

Date	Rev. No.	Contents	Remark
Jan.18th.'11	0.0	- Initial issue	-
Apr.25th.'11	0.1	- 24page Gamma updated - 40~48page updated	-
May.27th.'11	0.2	- 4page Page number updated - 6page Width updated - 25page YUVtoRGB updated - 39page Comment added - 40page Product drawing updated - 41page From LCD Modules to AMOLED Modules updated - 48page "confidential" deleted	-
Jun.14th.'11	0.3	- 10page component voltage updated - 34page pixel size error corrected - 34page maximum size of Polarizer dent and foreign material updated - 34page Tuffy, Polarizer, FPC inspection updated - 35page Note1) error corrected, Glass chipping Note2 deleted - 36page static push test added - 40page Product drawing updated	-
Jun.23th.'11		- 35page glass chipping specification updated - 40page Product drawing updated	-
Jul.05th.'11	0.4	- 18page Power off sequence updated - 22page Sleep-in/sleep-out sequence updated	-
Oct.27th.'11	0.5	- 18page 9-3-1. Power off sequence(Slee in mode) added - 19page 9-3-2. Power off sequence(Software reset) added - 23page 9-7-1. Sleep-in/Sleep-out sequence(Slee in mode) added - 24page 9-7-2. Sleep-in/Sleep-out sequence(Software reset) added	-

Contents

1. Scope

This Specification defines general provisions as well as inspection standards for AM OLED module supplied by SAMSUNG Mobile Display Co., Ltd.,
If the event of unforeseen problems or unspecified items occurs, we naturally shall negotiate and agree to solution with customer.

2. Warranty

Basically, warranty term is 15 months of reliability characteristics of quality level after the outgoing date in SAMSUNG Mobile Display Co., Ltd., and SAMSUNG Mobile Display Co., Ltd., could compensate for defectives which happens within warranty term under condition that the products should be stored or be used as Specified under normal condition within the contents of Specification.
Otherwise, it is impossible to compensate for defectives when they happens by customer's mistake such as careless handing or circuit change, etc.
And after 15 months of warranty term, all replacements for defectives will be charged.

This Specification stipulates the final and comprehensive requirements for the respective products hereof. Beyond this Specification, it is responsibility of the customer to explicitly disclose any additional requirements, information or reservations regarding these requirements to Samsung Mobile Display prior to implementation, where any and all disclosures of the customer shall be with an authorized representative of Samsung Mobile Display in writing. Samsung Mobile Display shall not be responsible for safety, performance, functionality, compatibility of the system with which the SAMSUNG Mobile Display-supplied components are integrated unless such features have been expressly communicated and described in the Specification. SAMSUNG Mobile Display MAKES NO GUARANTY OR WARRANTY, EXPRESS OR IMPLIED , INCLUDING BUT NOT LIMITED TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, TO ANY PARTY.Moreover, any party should do their own due diligence regarding these requirements prior to implementation.

3. Features

1) Display Color : 16M Color (RGB)
2) Display Format : 3.26" Visual WVGA 854(W)×480(H)
3) Interface : RGB 24bits, SPI-4/3 line
4) Driver IC : D53E6EA8805 By Magnachip
5) Polarizer : Hard Coating Glare Polarizer

4. Mechanical Specification

Item	Specifications	Unit
Dimensional outline	80.56(W) X 47.16(H) X 0.76(T)	mm
Number of dots	427(W) X R(B)GB(R)G X 480(H)	Dots
Active area	72.16(W) X 40.56(H)	mm
Diagonal Inch	3.26	inch
Dots size	0.0423(W) X 0.0845(H)	mm

5. Maximum Rating

Item		Symbol	Min.	Max.	Unit	Note
Supply voltage	Logic Power	VDD	-0.3	2.5	V	(1),(2)
		VCCIO1,2	-0.3	4.0	V	(1),(2)
		VCI	-0.3	4.0	V	(1),(2)
	Power	ELVDD	-0.3	6	V	-
		ELVSS	-10	0.3	V	-
Input voltage		VI	-0.3	VCCIO+0.3	V	(2)
Operating temperature		Top	-30	70	℃	-
Humidity		Hop	10	95	%(RH)	-
Storage temperature		Tstg	-30	85	℃	-

Note 1) VDD, VCCIO1,2, VCI should satisfy the below condition of VDD, VCCIO1,2, VCI > VSS (AGND).

Note 2) If the supplied voltage exceeds the maximum limitation, LSI can be damaged permanently. Therefore, while operating, it is recommend to use LSI within the maximum electrical limitation.
If not, LSI can cause decreased reliability or operational problems.

6. Electrical Characteristics

-. Test Conditions: VCCIO1=3.0V, VCCIO2=1.8V, VCI=3.0V, VSS=0V, Temp.=25°C, Full White unless otherwise Specified.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Supply voltage	Logic	VDD	-	1.35	1.5	1.75	V	
		VCCIO1,2	-	1.65	-	3.6		
		VCI	-	2.5	-	3.6		
	Power	ELVDD	-	4.554	4.6	4.646		
		ELVSS	10 < T≤30	-4.515	-4.3	-4.085		
			T≤10	-5.145	-4.9	-4.655		
Input Voltage	"H" level	VIH	1.65<VCCIO<2.30	0.7*VCCIO	-	VCCIO	V	(1)
		VIH	2.30<VCCIO<3.60	0.8*VCCIO	-	VCCIO		
	"L" level	VIL	1.65<VCCIO<2.30	0	-	0.3*VCCIO		
		VIL	2.30<VCCIO<3.60	0	-	0.2*VCCIO		
Output Voltage	"H" level	VOH	IOH = -0.4mA	VCCIO-0.4	-	-	V	(2)
	"L" level	VOL	IOL = 0.4mA	-	-	0.4		
Leakage Current	Input leakage	ILI	VI=GND or VCCIO	-1	-	1	uA	(1)
	output leakage	IIL		-1	-	1	uA	(3)
Supply Current (1)	EL Power (300cd/㎡ Full White.)	IBAT	ELVDD=4.6V ELVSS= -4.3 (VBAT=3.8V)	-	310	410	mA	-
Module Current Consumption		IVCCIO1,2	VCCIO1=3.0V	-	3.8	5	mA	
			VCCIO2=1.8V	-	11	15	mA	
		IVCI	VCI=3.0V	-	30	40	mA	-
		Istby	VCCIO1=3.0V		0.2	0.3	mA	
			VCCIO2=1.8V		0.2	0.3	mA	
			VCI=3.0V		0.3	0.4	mA	

Note)

VCCIO1 : Power pin for logic I/O for RESETB, CSB, SCL, SDI, RS.

VCCIO2 : Power pin for logic I/O for DB[23:0], DOTCLK, HSYNC, VSYNC

IBAT 消費電流値が300cd/m2基準400mAを超える場合 輝度を260cd/m2に調整します

Note1) DB[23:0], VSYNC, HSYNC, DOTCLK, SCL, CSB, SDI, RESETB ports

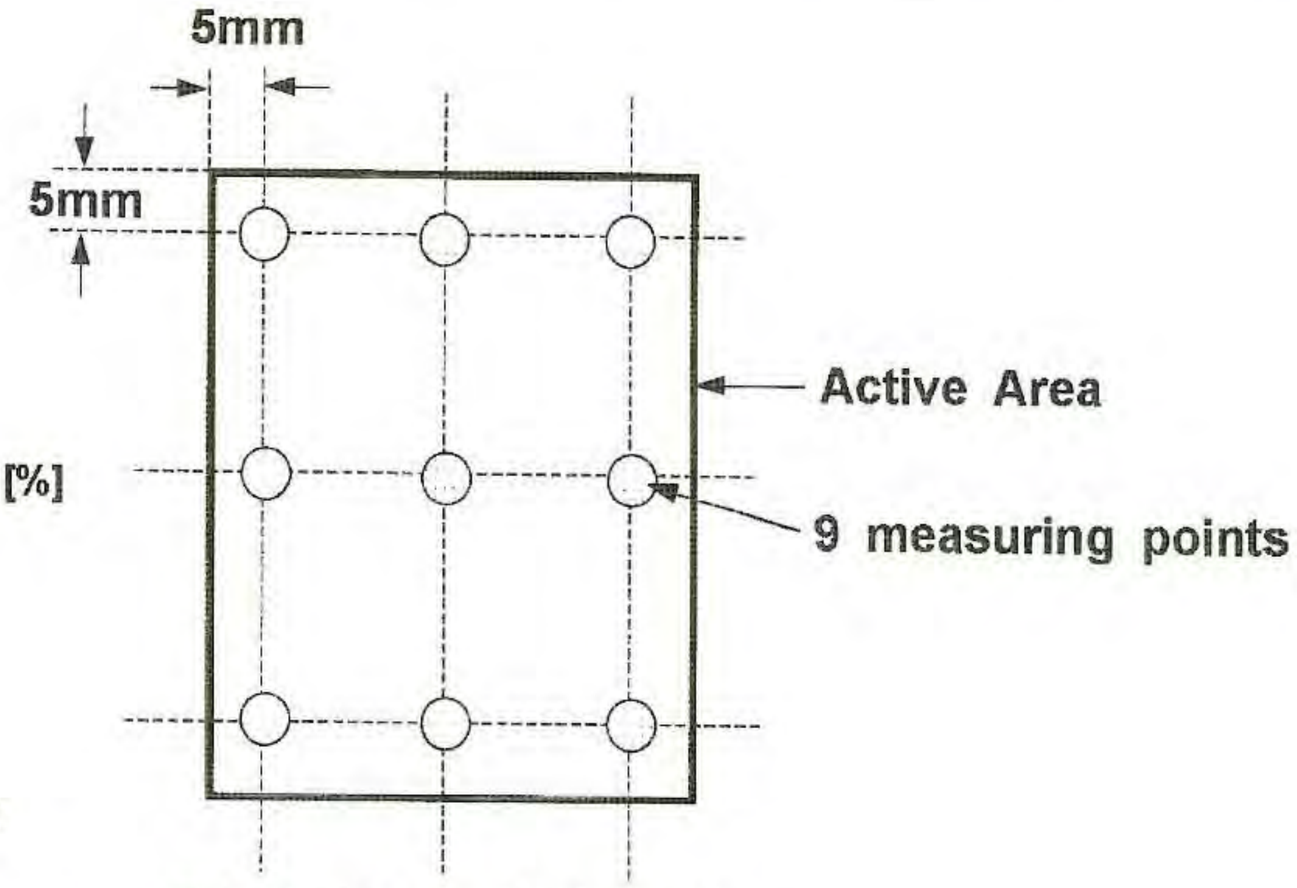
Note2) DB[23:0] ports

Note3) Applicable at DB[23:0] = high impedance state

7. Electro-Optical characteristics

Item		Symbol	Temp	Condition	Min.	Typ.	Max.	Unit	Note
Brightness			25℃	Normal (White Mode)	240	300	360	cd/m²	(1)
Uniformity			25℃	Normal (White Mode)	70	85	-	%	(1)
Contrast ratio		K	25℃	Φ=0°,θ=0°	2000	10000	-	-	(2)
Color of CIE coordinate	White	x	25℃	Φ=0° θ=0°	0.273	0.293	0.313	-	(1),(2),(3) (4)
		y			0.285	0.305	0.325	-	
	Red	x			0.625	0.675	0.725	-	
		y			0.275	0.325	0.375	-	
	Green	x			0.170	0.220	0.270	-	
		y			0.675	0.725	0.775	-	
	Blue	x			0.095	0.145	0.195	-	
		y			0.005	0.055	0.105	-	
Color Gamut			25℃	vs. NTSC	90	100	-	%	-
Crosstalk			25℃		-	-	4	%	(5)
Viewing angle			25℃	Upper/Down/Right/Left CR ratio ≥200	Over 80°				-
Response Time			25℃		-	-	1	ms	-

Note (1) Uniformity measuring point

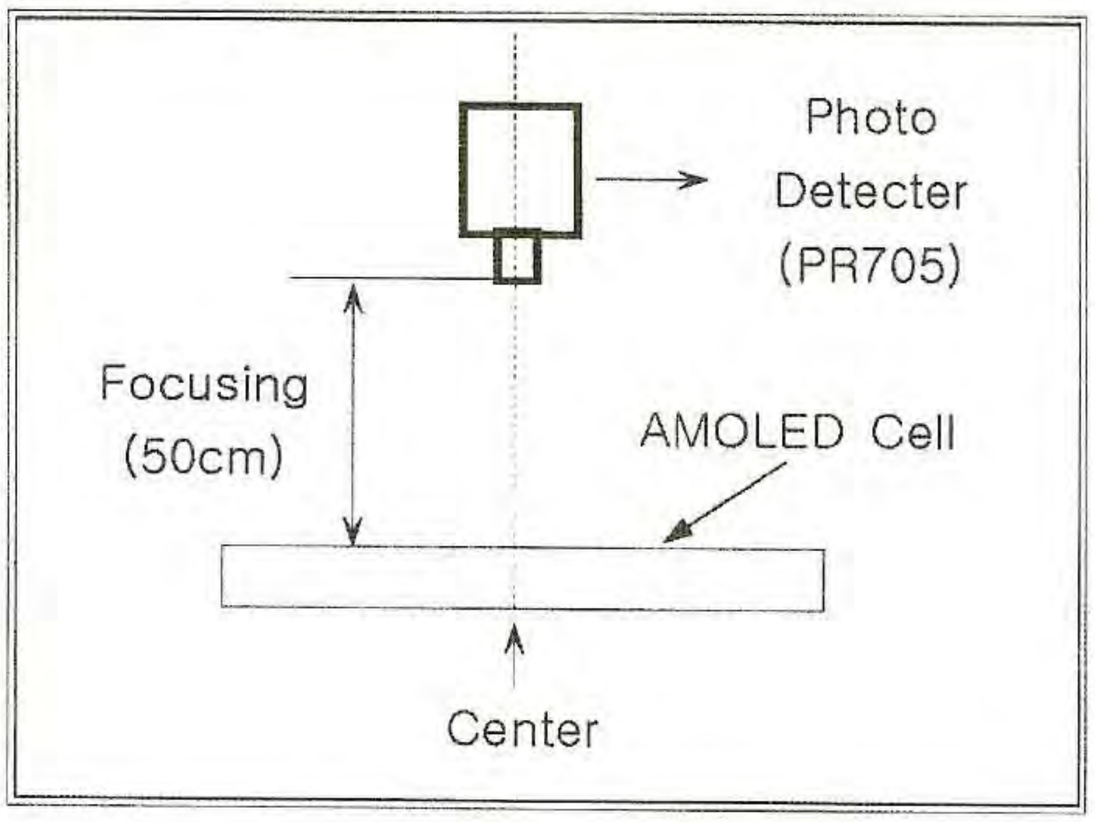


Uniformity = Lmin / Lmax * 100 [%]

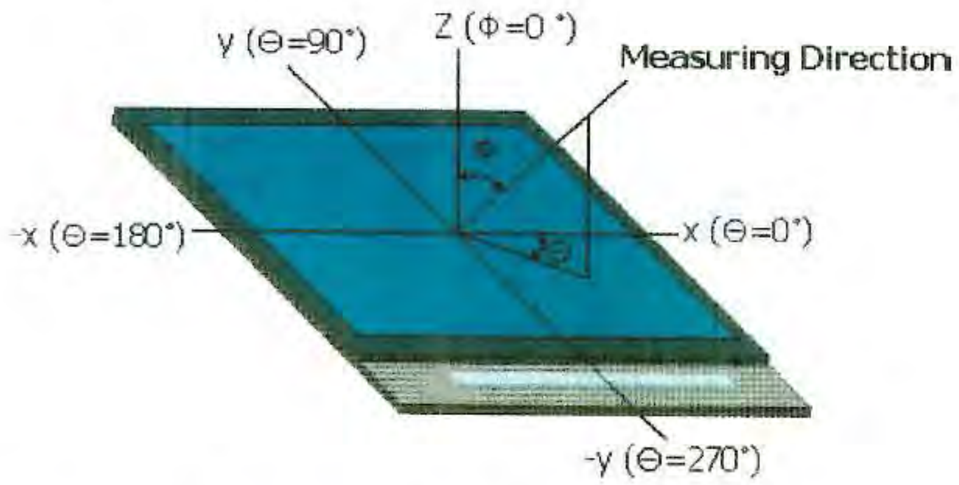
Note (2) Defiition of contrast ratio (K)

$$\text{Contrast Ratio(K)} = \frac{\text{Brightness of selected dot (White patterned area) at 300cd/m}^2}{\text{Brightness of non-selected dot (Black patterned area) at 300cd/m}^2}$$

Note (3) Optical measuring system, temperature regulated chamber
external Light : dark state



Note (4) Define of Φ and θ



Note (5) Less than 4%, unless detected by visual.

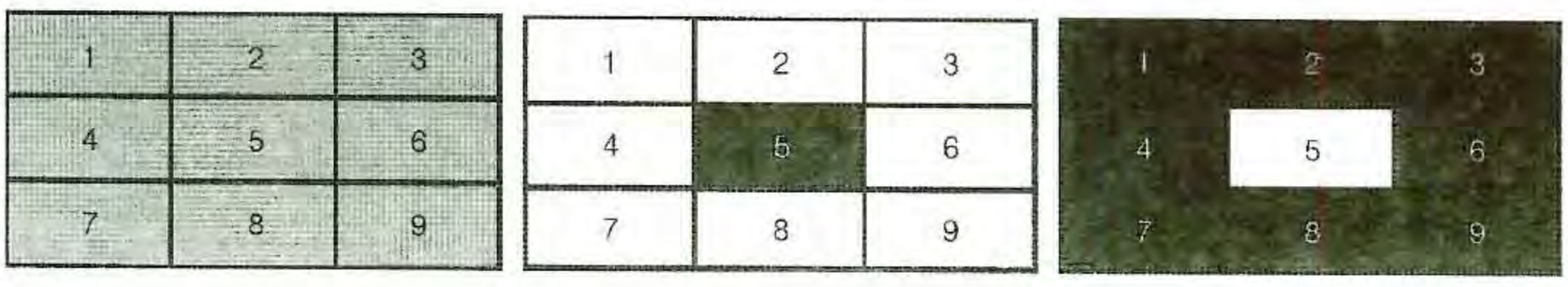
f Crosstalk is detected by visual, we shall negotiate and agree to solution with customer.

※ Define of Crosstalk ※

Measure the luminance of 9 points at White box, Black box, 128 gray pattern.

Compare the White box/128grey pattern 2 points

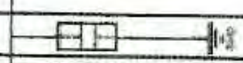
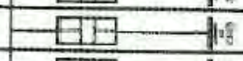
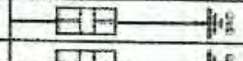
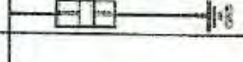
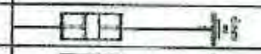
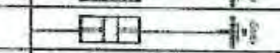
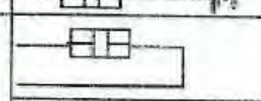
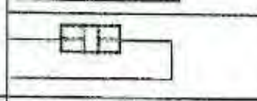
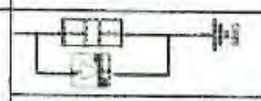
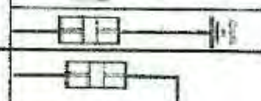
box pattern. Calculate the luminance ratio between near 2 area and and check the maximum value.



Note) If Flicker is detected by visual, we shall negotiate and agree to solution with customer.

8. Input/Output Terminal Assignment

8-1. I/O Connection

#	Pin name	Descriptions	Connection to Component	
1	GND	Ground		
2	ELVDD	Positive voltage of DC/DC		
3	ELVDD			
4	ELVSS	Negative voltage of DC/DC		
5	ELVSS			
6	VGL	A power for gate driver		1000nF/10V
7	VINT	A power for gate driver		1000nF/10V
8	VGH	A power for gate driver		1000nF/10V
9	VREGOUT	A reference voltage for grayscale generation block		1000nF/6.3V
10	VREFO	A reference voltage input pin of VCI1 generator		4700nF/6.3V
11	RVDD	Regulated logic power voltage(1.5V)		1000nF/6.3V
12	VCI	Power pin for analog		
13	VCCIO2	Power pin for logic I/O (1.65~3.6V)		
14	EL_ON	External DC/DC on/off control signal		
15	DB0	Image data input bus for RGB interface		
16	DB1			
17	DB2			
18	DB3			
19	DB4			
20	DB5			
21	DB6			
22	DB7			
23	DB8			
24	DB9			
25	DB10			
26	DB11			
27	DB12			
28	DB13			
29	DB14			
30	DB15			
31	DB16			
32	DB17			
33	DB18			
34	DB19			
35	DB20			
36	DB21			
37	DB22			
38	DB23			
39	GND	Ground		
40	DOTCLK	Pixel clock signal		
41	GND	Ground		
42	HSYNC	Horizontal line synchronizing signal		
43	VSYNC	Frame synchronizing signal		
44	SDI	Serial data transfer I/O in SPI interface		
45	SCL	Synchronous clock for SPI interface		
46	CSB	Chip select signal for SPI interface		
47	RESETB	Reset pin		
48	VCCIO1	Power pin for logic I/O (1.65~3.6V)		
49	OTPV	SMD internal use, open when is not used		
50	VCI1	A reference voltage for boosting circuit		1000nF/6.3V
51	VLOUT1	Step-up voltage output for boosting circuit		1000nF/10V
52	C11P	Flying capacitor for step-up circuit		1000nF/6.3V
53	C11M			
54	C12P			1000nF/6.3V
55	C12M			
56	VLOUT3	Step-up voltage output for boosting circuit		1000nF/16V
57	VLOUT2			RB520G-30GT2R,30V,100mA 1000nF/16V
58	C2P	Flying capacitor for step-up circuit		1000nF/16V
59	C2M			
60	C3P			1000nF/16V
61	C3M			