

Date : Aug. 29, 2011

Specification for Approval

Customer :

Product Name : AMOLED Module

Model Name : AMS397GE37

Description : 3.97" WVGA(480x800) 16M Color

Proposed by			Customer's Approval
Designed	Checked	Approved	

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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 (22±3°C Room Temperature and 65±20% Room Humidity Storage) 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.

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3. Features

- 1) Display Color : 16M Color (RGB)
- 2) Display Format : 480(W)×RG(BG)×800(H) dots / RG(BG) Visual type
- 3) Interface : RGB 24bits, SPI 3-Wire, I2C for Touch
- 4) Driver IC : S6E63M0 by Samsung Electronics
- 5) Polarizer : Hard Coating (HC Pol.)
- 6) TSP : OCTA (On Cell Touch, C_Type)
- 7) TSP Driver IC : mXT224E by ATMEL

4. Mechanical Specification

Item	Specifications	Unit
Dimensional outline	61.4 X 118.2	mm
Number of dots	480(W) X RG(BG) X 800(H)	Dots
Active area	51.84(W) X 86.40(H)	mm
Diagonal Inch	3.97	inch
Pixel pitch	0.216(W) X 0.216(H)	mm
Dots size	0.108(W) X 0.216(H)	mm

5. Maximum Rating

Item		Symbol	Min.	Max.	Unit	Note
Supply voltage	DDI	VDD3	-0.3	5.0	V	(1),(2)
		VCI	-0.3	5.0	V	(1),(2)
	TSP	VDD	-	3.6	V	
		AVDD	-	3.6	V	
Operating temperature		Top	-20	60	°C	-
Humidity		Hop	10	90	%(RH)	-
Storage temperature		Tstg	-30	70	°C	-

Note 1) VDD3, VCI should satisfy the below condition of VDD3, VCI > VSS (AGND).

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

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6. Electrical Characteristics

- Test Conditions : VDD3=1.8V, VCI=3.0V, ELVDD=4.6V, ELVSS=-4.9V, VSS=0V, Temp.=25℃, unless otherwise Specified.

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Supply voltage	DDI	VDD3	-	1.65	1.8	3.3	V (1)
		VCI	-	2.5	2.8	3.3	
	TSP	VDD		1.71	1.8	1.89	
		AVDD		2.71	2.85	2.99	
	EL Power	ELVDD	-	4.6	-		
		ELVSS	-	-4.9	-		
Input Voltage	"H" level	VIH	-	0.7*VDD3	-	VDD3	V
	"L" level	VIL	-	0.0	-	0.3*VDD3	V
Output Voltage	"H" level	VOH	Iout = -10uA	0.8*VDD3	-	VDD3	V
	"L" level	VOL	Iout = +10uA	0.0	-	0.2*VDD3	
Supply Current	EL Power (300cd/m ² Full White.)	IELVDD	ELVDD=4.6V	-	170	220	mA
		IELVSS	ELVSS= -4.9V		170	220	mA
Current Consumption	Sleep Out Mode	IVCI	Frame Freq. = 60Hz White Image	-	20	50	mA
	Sleep In Mode	IVCI	-	-	25	100	uA

Note(1) : ELVDD and ELVSS specification is followed DCDC IC (STOD13AS)

[TSP]

- Test Conditions : AVDD3=2.7V, VDD=1.8V, ELVDD=4.6V, ELVSS=-4.9V, VSS=0V, Temp.=25℃, unless otherwise Specified.

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Reference	Ref.	-	3680	-	13208		

Note : It is followed touch driver IC (mXT224E by ATMEL)

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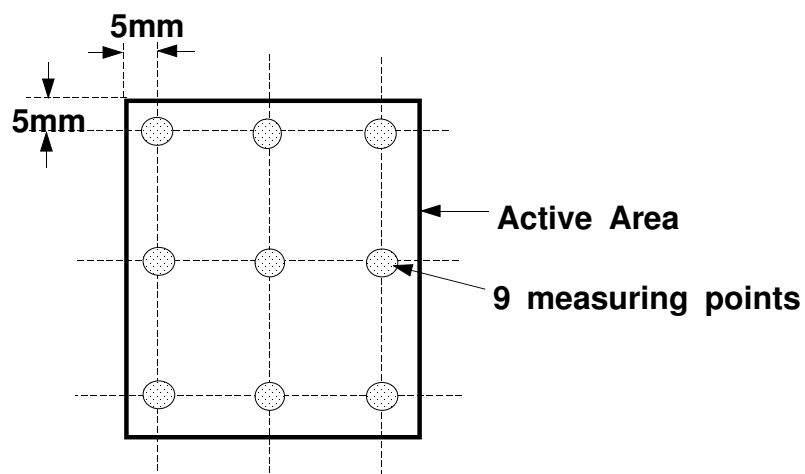
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7. Electro-Optical characteristics

- Test Conditions : VDD3=1.8V, VCI=3.0V, ELVDD=4.6V, ELVSS=-4.9V, VSS=0V, Temp.=25℃, unless otherwise Specified.

Item		Symbol	Temp	Condition	Min.	Typ.	Max.	Unit	Note
Brightness (with Window+ TSP)			25℃	Normal (White Mode)	240	300	360	cd/m ²	(1)
Uniformity			25℃	Normal (White Mode)	80	85	-	%	(1)
Contrast ratio		K	25℃	Φ=0°,θ=0°	3000	10000	-	-	(2)
Color of CIE coordinate	White	x	25℃	Φ=0° θ=0°	0.295	0.315	0.335	-	(1),(2),(3), (4)
		y			0.310	0.330	0.350	-	
	Red	x			0.645	0.675	0.705	-	
		y			0.295	0.325	0.355	-	
	Green	x			0.170	0.220	0.270	-	
		y			0.675	0.725	0.775	-	
	Blue	x			0.105	0.145	0.185	-	
		y			0.015	0.055	0.095	-	
Color Gamut			25℃	vs. NTSC	90		-	%	
View angle			25℃	Upper/Down/Right/Left Contrast Ratio ≥200	Over 80°				
WAD			25℃	It is determined using limited Sample. (Δx=0.04)					
Life Time			25℃	50% Luminance Drop @160nit (General User Operating Level)	24000Hr				MTTF

NOTE (1) Uniformity measuring point



$$\text{Uniformity} = L_{\min} / L_{\max} * 100 [\%]$$

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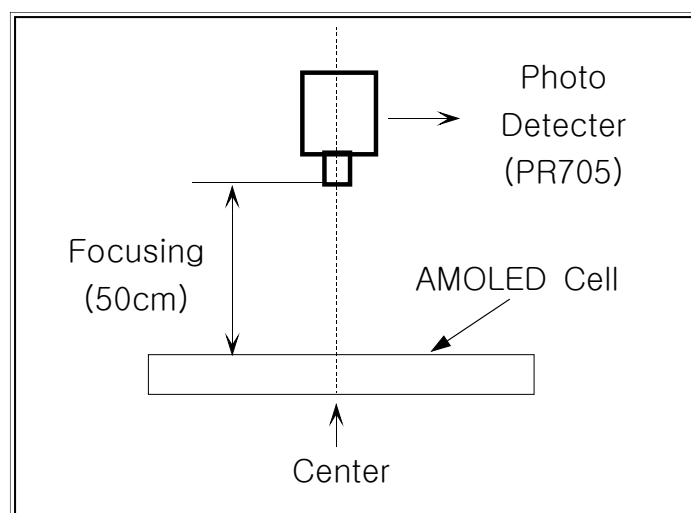
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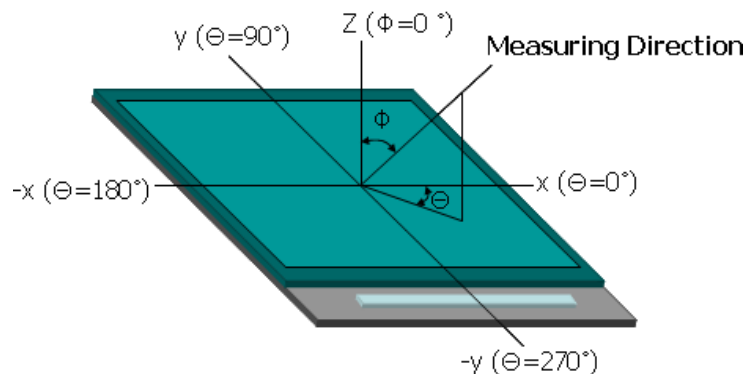
Note (2) Definition of contrast ratio (K)

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

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



Note (4) Definition of Φ , θ



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8. Input/Output Terminal Assignment

8-1. I/O Connection

No.	TYPE		Descriptions
1	-	GND	Ground
2	-	GND	Ground
3	I	SCL	Synchronizing clock signal in the SPI mode
4	-	GND	Ground
5	I	SDA	A serial data input in SPI mode.
6	I	ENABLE	Data enable signal in RGB I/F mode
7	I	CSX	Chip select input pin
8	I	VSYNC	Vertical sync. Signal in RGB I/F mode
9	-	GND	Ground
10	I	HSYNC	Horizontal sync. Signal in RGB I/F mode.
11	-	GND	Ground
12	I	DOTCLK	Pixel clock signal in RGB I/F mode
13	I	RESX	Reset the Display Driver IC. Active Low
14	-	GND	Ground
15	I(Power)	VDD3	External Power Input
16	-	GND	Ground
17	I	DB22	RGB interface data bus.
18	I	DB23	RGB interface data bus.
19	I	DB20	RGB interface data bus.
20	I	DB21	RGB interface data bus.
21	I	DB18	RGB interface data bus.
22	I	DB19	RGB interface data bus.
23	I	DB16	RGB interface data bus.
24	I	DB17	RGB interface data bus.
25	I	DB14	RGB interface data bus.
26	I	DB15	RGB interface data bus.
27	I	DB12	RGB interface data bus.
28	I	DB13	RGB interface data bus.
29	I	DB10	RGB interface data bus.
30	I	DB11	RGB interface data bus.
31	I	DB8	RGB interface data bus.
32	I	DB9	RGB interface data bus.
33	I	DB6	RGB interface data bus.
34	I	DB7	RGB interface data bus.
35	I	DB4	RGB interface data bus.
36	I	DB5	RGB interface data bus.
37	I	DB2	RGB interface data bus.
38	I	DB3	RGB interface data bus.
39	I	DB0	RGB interface data bus.
40	I	DB1	RGB interface data bus.
41	I(Power)	VCI	Analog Power Input
42	-	GND	Ground
43	I(Power)	ELVSS	Negative voltage of DC/DC Output
44	I(Power)	ELVDD	Positive voltage of DC/DC Output
45	I(Power)	ELVSS	Negative voltage of DC/DC Output
46	I(Power)	ELVDD	Positive voltage of DC/DC Output
47	O	EL ON	Control signal for ELVDD, ELVSS external DC/DC converter
48	I(Power)	VCC	Digital Power For TSP
49	I	TSP SCL	Serial Interface Clock for TSP
50	I(Power)	TSP VAVDD	Analog Power for TSP
51	-	MTPHV	SMD internal use, open when is not used.
52	I	TSP INT	State Change Interrupt for TSP
53	I	TSP SDA	Serial Data Input for TSP
54	-	GND	Ground
55	-	GND	Ground
56	-	GND	Ground
57	-	GND	Ground
58	-	GND	Ground
59	-	GND	Ground
60	-	GND	Ground

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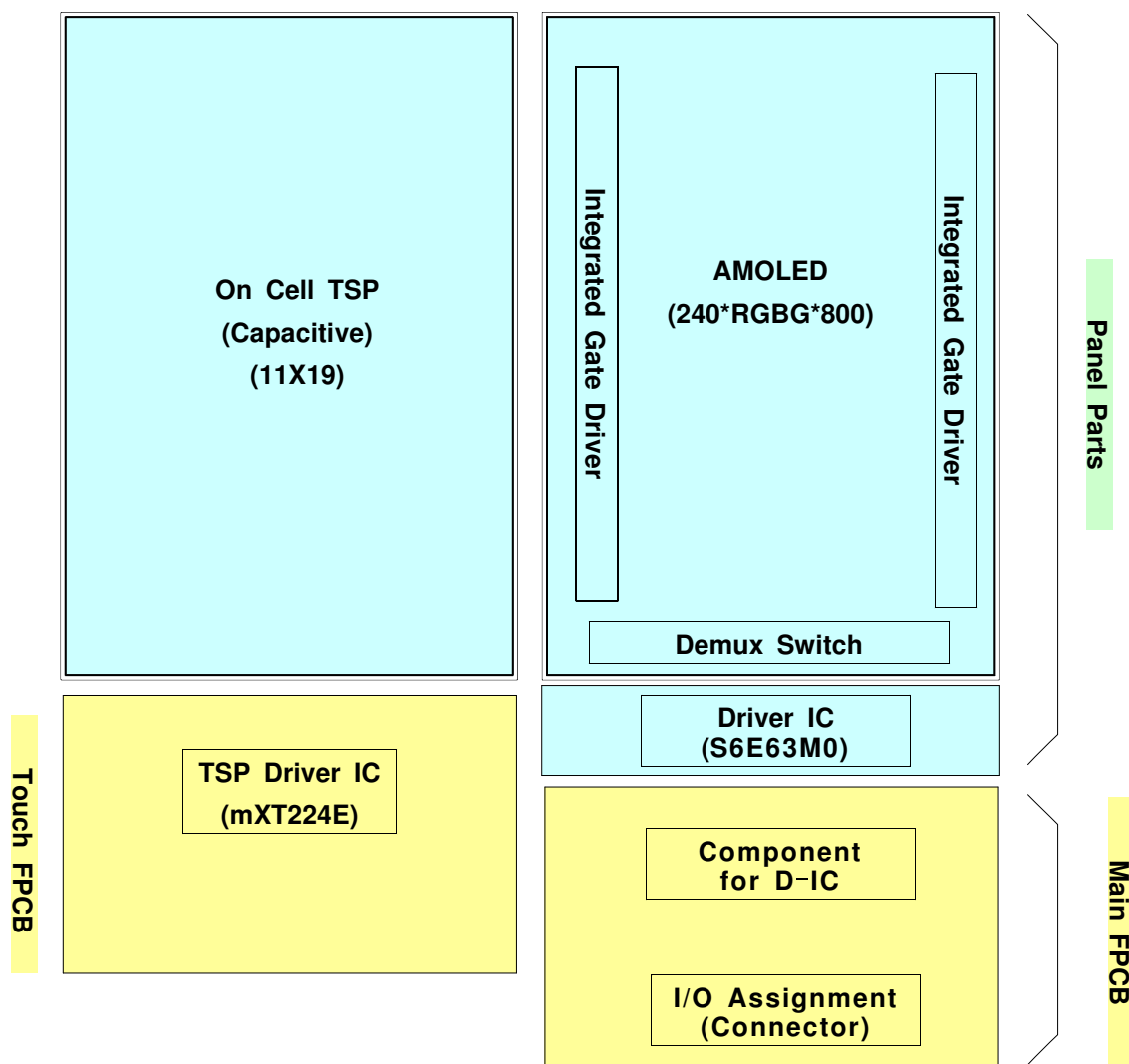
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8-2. Circuit block diagram (Module)



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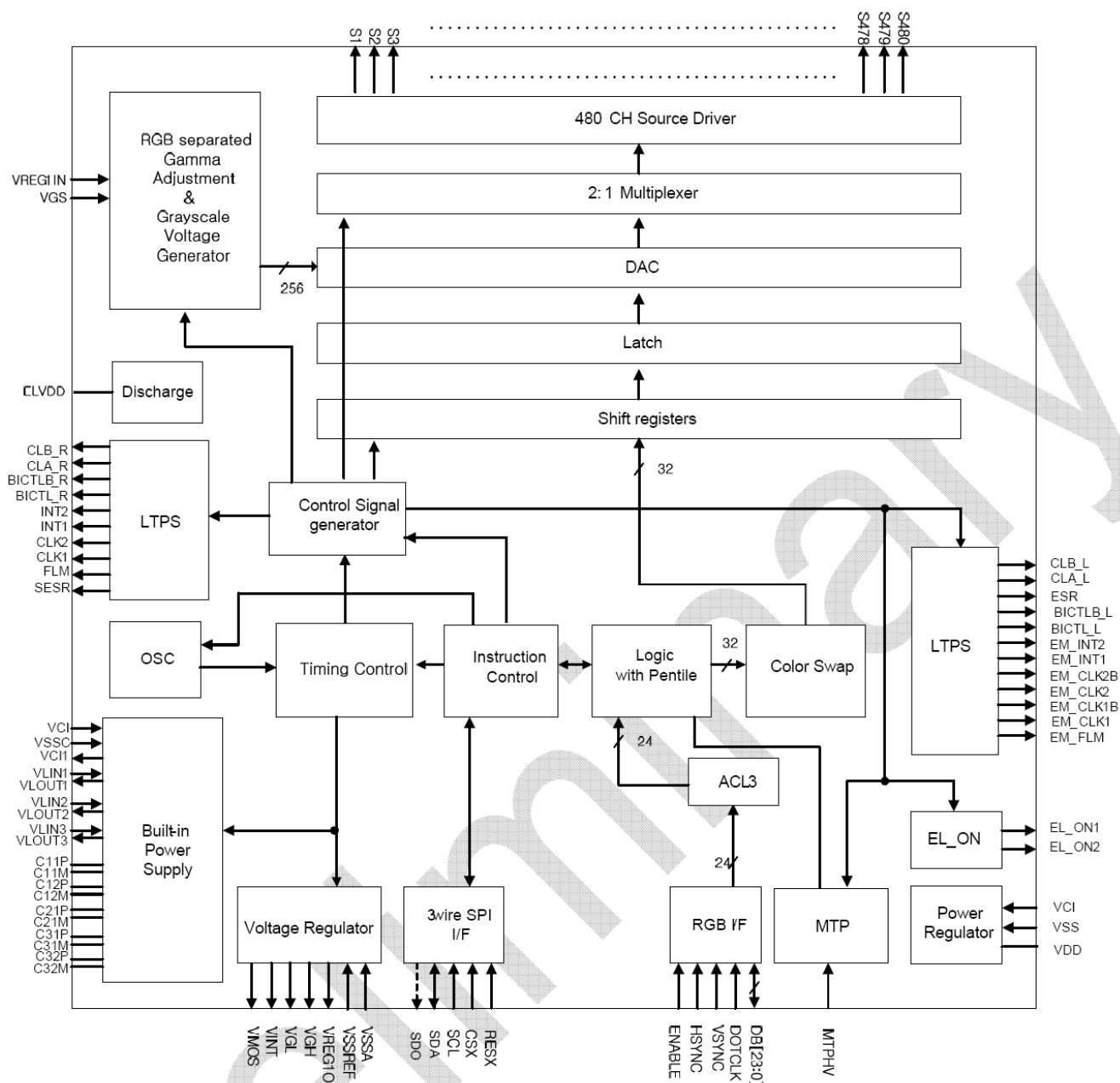
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8-3. Circuit block diagram (AMOLED Driver IC)



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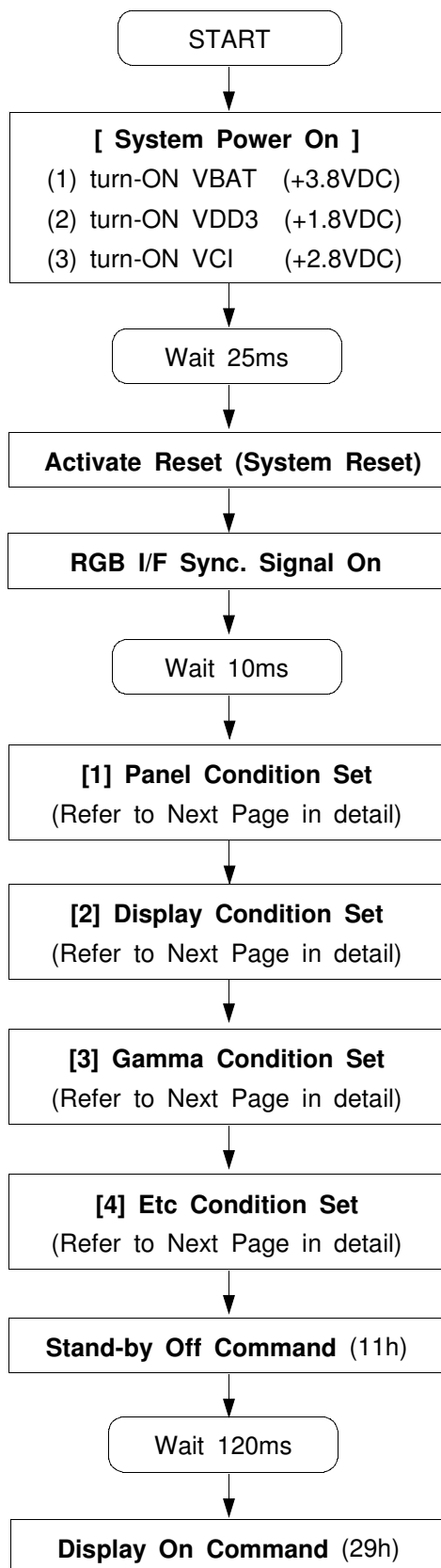
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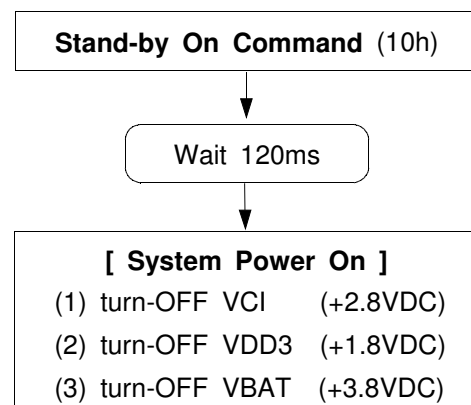
9 Recommended Operating Sequence

9-1. Power ON/OFF sequence

[Power On Sequence]

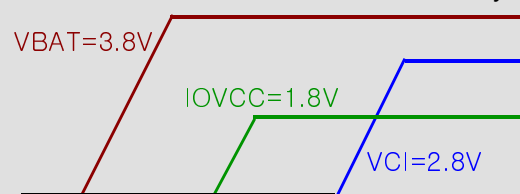


[Power Off Sequence]



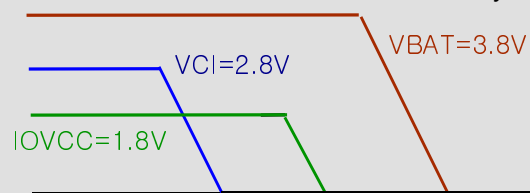
[System Power On Sequence]

VBAT→VDD3→VCI or Simultaneously



[System Power OFF Sequence]

VCI→VDD3→VBAT or Simultaneously



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9-2. Panel condition set

Command	Parameter		Description
F8h	1st	01h	DOCT
	2nd	27h	CLWEA
	3rd	27h	CLWEB
	4th	07h	CLTE
	5th	07h	SHE
	6th	54h	FLTE
	7th	9Fh	FLWE
	8th	63h	SCTE
	9th	86h	SCWE
	10th	1Ah	INTE
	11th	33h	INWE
	12th	0Dh	EMPS
	13th	00h	E_INTE
	14th	00h	E_INWE

9-3. Display condition set

Command	Parameter		Description
F2h	1st	02h	Number of Line : 800 line
	2nd	03h	VBP : 3 HSYNC
	3rd	1Ch	VFP : 28 HSYNC
	4th	10h	HBP : 16 DOTCLK
	5th	10h	HFP : 16 DOTCLK



Command	Parameter		Description
F7h	1st	00h	GTCON : Normal direction(Note 1)
	2nd	00h	Display Mode : 16M color
	3rd	00h	Vsync/Hsync/Enable : Low active DOCCLK : Rising edge active RGB mode : 24 Bits

(Note 1) GTCON 03h : In case of Reverse scan display.

9-4. Etc Condition Set

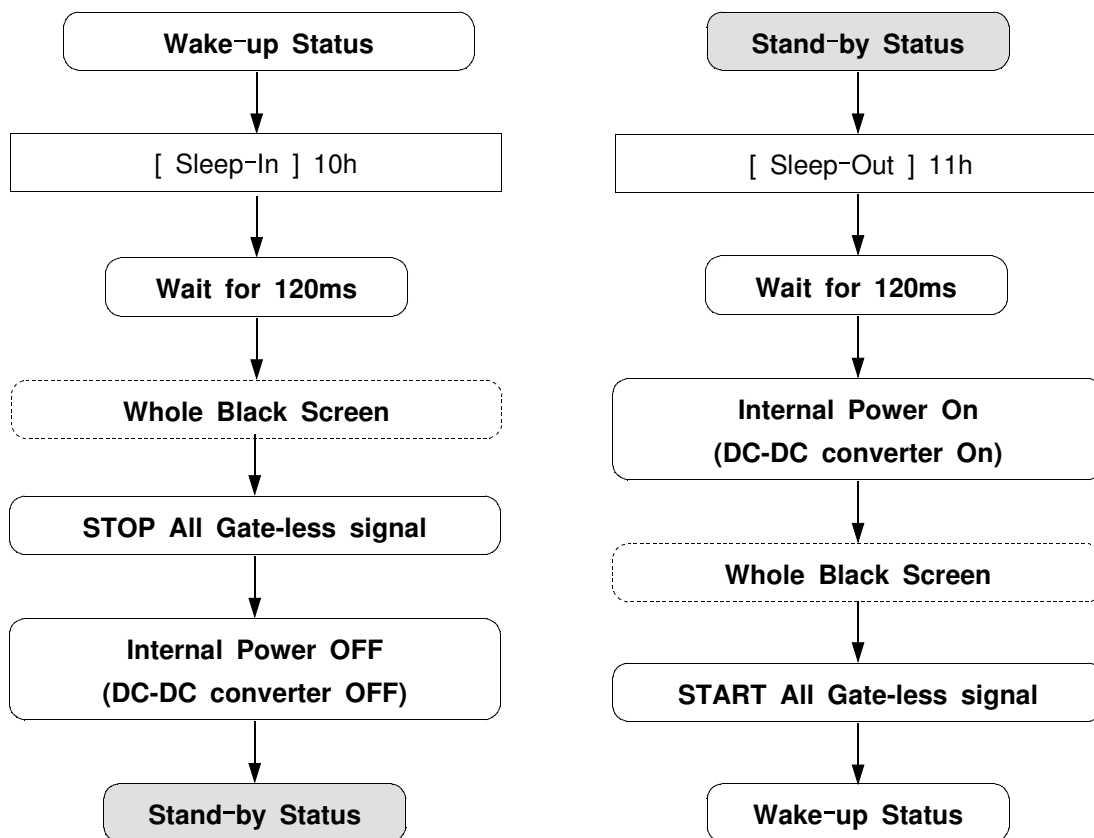
Command	Parameter		Description
F6h	1st	00h	Dummy source monitoring off
	2nd	8Eh	Controls slew-rate of Gamma amplifier
	3rd	07h	Source amp control

Command	Parameter		Description
B3h	1st	6Ch	Pentile Control

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9-5. Stand by/Wake up sequence



9-6. Gamma Condition Set (300nit, (x,y)=(0.315,0.330))

1) Gamma Setting

Command	Parameter		Description
FAh	1st	02h	Gamma set update disable
	2nd	18h	Red V1 Gamma
	3rd	08h	Green V1 Gamma
	4th	24h	Blue V1 Gamma
	5th	42h	Red V19 Gamma
	6th	51h	Green V19 Gamma
	7th	23h	Blue V19 Gamma
	8th	B0h	Red V43 Gamma
	9th	BAh	Green V43 Gamma
	10th	A7h	Blue V43 Gamma
	11th	ABh	Red V87 Gamma
	12th	B4h	Green V87 Gamma
	13th	A1h	Blue V87 Gamma
	14th	BCh	Red V171 Gamma
	15th	C2h	Green V171 Gamma
	16th	B5h	Blue V171 Gamma
	17th	00h	Red V255 Gamma
	18th	B8h	Red V255 Gamma
	19th	00h	Green V255 Gamma
	20th	A8h	Green V255 Gamma
	21st	00h	Blue V255 Gamma
	22nd	E0h	Blue V255 Gamma

1) Gamma Setting Update

Command	Parameter		Description
FAh	1st	03h	Gamma set update enable

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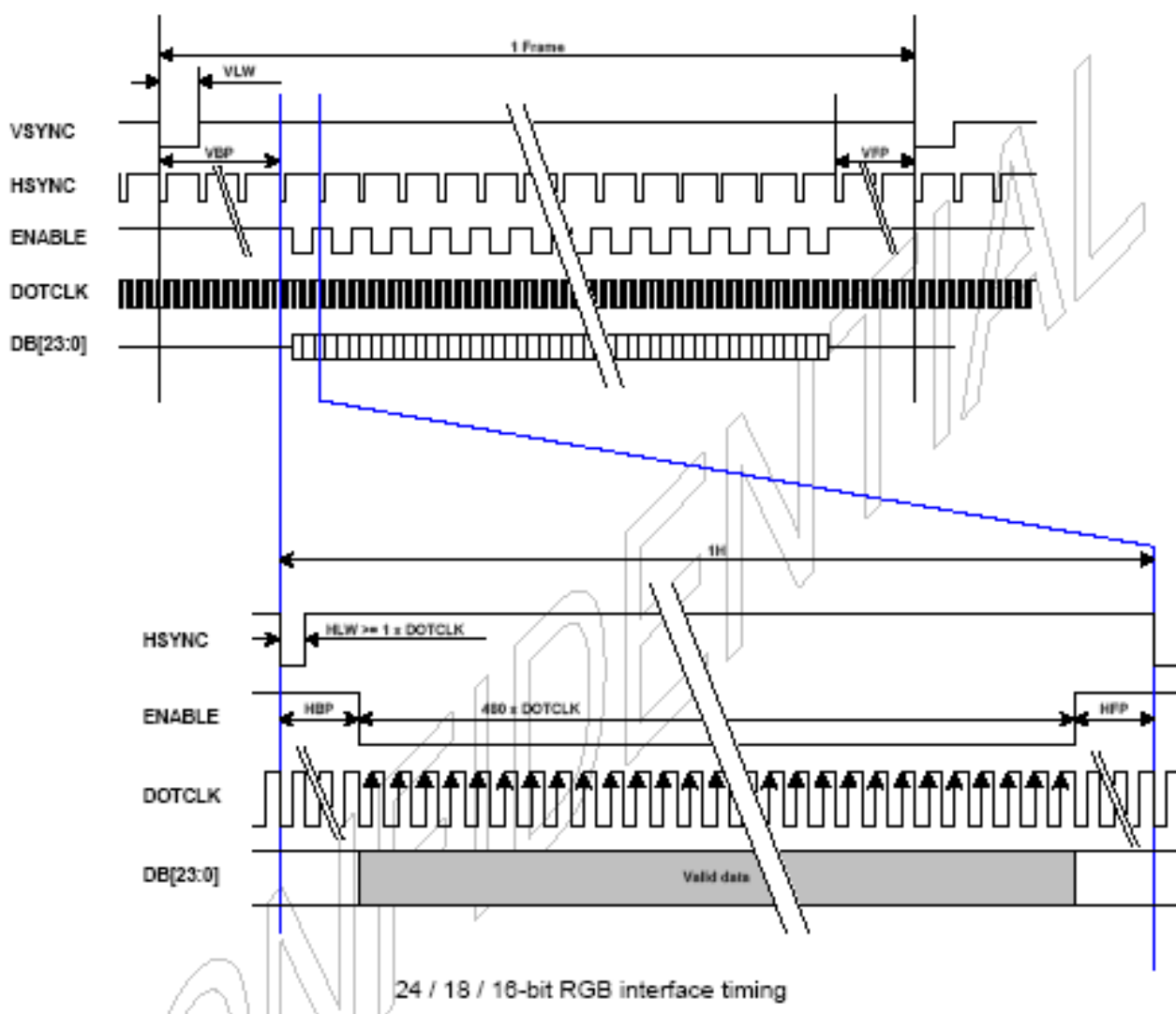
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9-7. RGB Interface Timing

- 1) VLW (period of VSYNC signal's "Low" level) = 2 x HSYNC period
- 2) HLW (period of HSYNC signal's "Low" level) = 2 x DOTCLK period
- 3) VBP (Vertical Back Porch) = 3 x HSYNC period
- 4) VFP (Vertical Front Porch) ≥ 28 x HSYNC period
- 5) HBP (Horizontal Back Porch) ≥ 8 x DOTCLK period
- 6) HFP (Horizontal Front Porch) ≥ 8 x DOTCLK period

* Example for estimating DOTCLK frequency in case of Pixel Format = 480(H) * 800(V)

$$\begin{aligned} \text{DOTCLK freq.} &= \text{Frame freq.} * (\text{VBP} + \text{VFP} + \text{Vertical Lines}) * (\text{HBP} + \text{HFP} + \text{Horizontal Lines}) \\ &= 60 \text{ Hz} * (3 + 28 + 800) * (16 + 16 + 480) \div 25.53\text{MHz} \text{ (Period} \div 39.17\text{ns)} \end{aligned}$$



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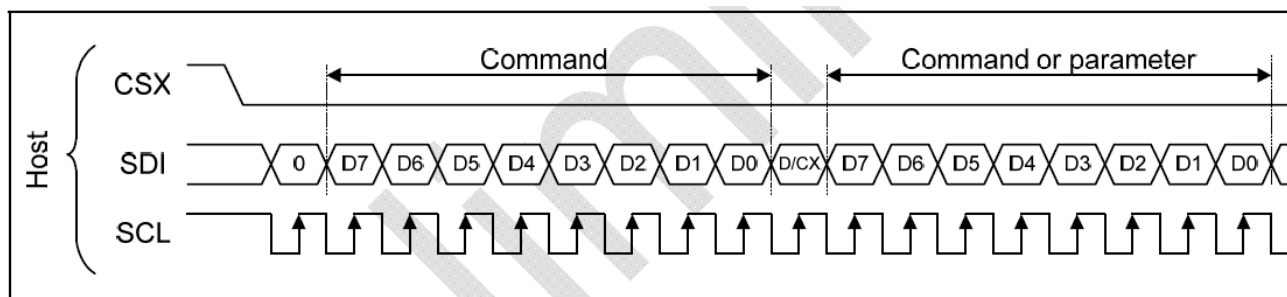
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9-8. Instruction Command Format

S6E63M0 only support Serial Peripheral Interface(SPI) for instruction transmission and display data transmission can only write via the RGB interface. Serial data must be input to SDA in the sequence D/CX, D7 to D0. The first bit of serial data D/CX is data/command flag. when D/CX = "1", D7 to D0 bits are command parameters. When D/CX = "0", D7 to D0 bits are commands.



Instruction Command Write Operation (3-wire 9bits SPI Mode)

ex-1) "Sleep out(11h)" (only 1-byte command)

☞ A user should send (1bit + 1byte), command flag bit "0b" and command "11h".

ex-2) "Gamma Set Update(FAh, 01h)" (1-byte command and 1-byte parameter)

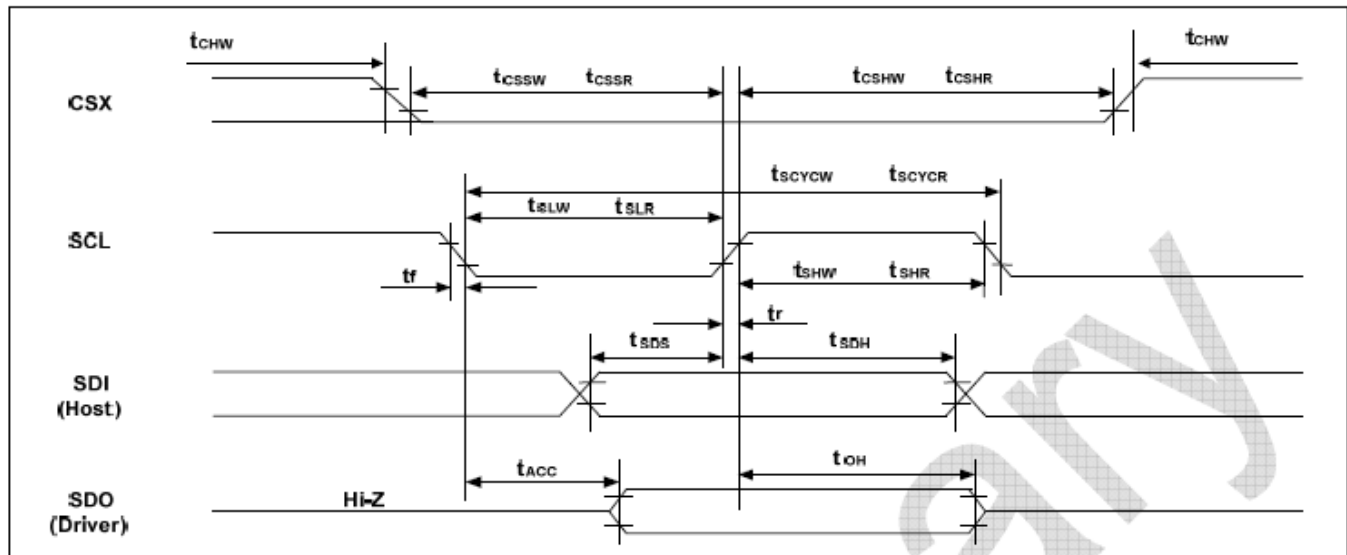
☞ A user should send (1bit + 1bytes) + (1bit + 1byte), command flag bit "0b", command "FAh", parameter flag bit "1b" and parameter "01h"

ex-2) "Display control(F2h)" (1-byte command and 5-byte parameter)

☞ A user should send (1bit + 1bytes) + (1bit + 1byte) + (1bit + 1byte) + (1bit + 1byte) + (1bit + 1byte) + (1bit + 1byte), command flag bit "0b", command "F2h", parameter flag bit "1b" and parameter "02h", parameter flag bit "1b", parameter "03h", parameter flag bit "1b", parameter "1Ch", parameter flag bit "1b", parameter "10h", parameter flag bit "1b" and parameter "10h".

10. AC Characteristics

10-1. Clock synchronous serial interface timing characteristics



$T_a = -30 \sim +70^\circ\text{C}$, $V_{DD3}=1.65\text{V}\sim 3.3\text{V}$, $V_{DD}=2.5\text{V}\sim 3.3\text{V}$

Parameter	Symbol	Conditions	Min.	Max.	Unit
Serial Clock Cycle(Write)	$t_{SCYC W}$	SCL	100	-	ns
SCL "H" pulse width(Write)	t_{SHW}	SCL	35	-	ns
SCL "L" pulse width(Write)	t_{SLW}	SCL	35	-	ns
Data setup time(Write)	t_{SDS}	SDI(=SDA)	30	-	ns
Data hold time(Write)	t_{SDH}	SDI(=SDA)	30	-	ns
Serial Clock Cycle(Read)	$t_{SCYC R}$	SCL	150	-	ns
SCL "H" pulse width(Read)	t_{SHR}	SCL	60	-	ns
SCL "L" pulse width(Read)	t_{SLR}	SCL	60	-	ns
Access time	t_{ACC}	SDO(=SDA)	10	50	ns
Output disable time	t_{OH}	SDO(=SDA)	15	50	ns
CSX "H" pulse width	t_{CHW}	CSX	40	-	ns
CSX-SCL time(Write)	t_{CSSW}	CSX	30	-	ns
	t_{CSHW}	CSX	30	-	ns
CSX-SCL time(Read)	t_{CSSR}	CSX	60	-	ns
	t_{CSHR}	CSX	60	-	ns

Note 1: The output signal's rise and fall times are stipulated to be from TBD to 15ns.

Note 2: The signal's rise and fall times (t_r , t_f) are stipulated to be equal to or less than 15ns.

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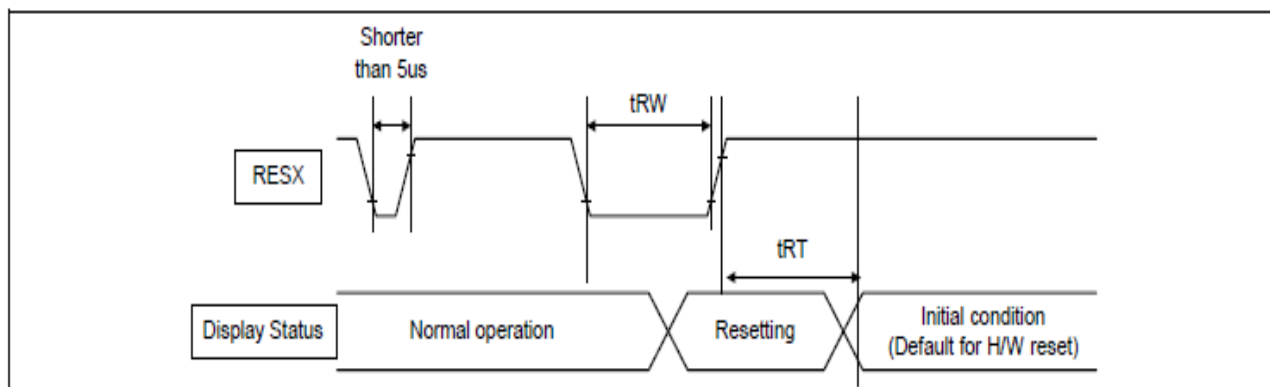
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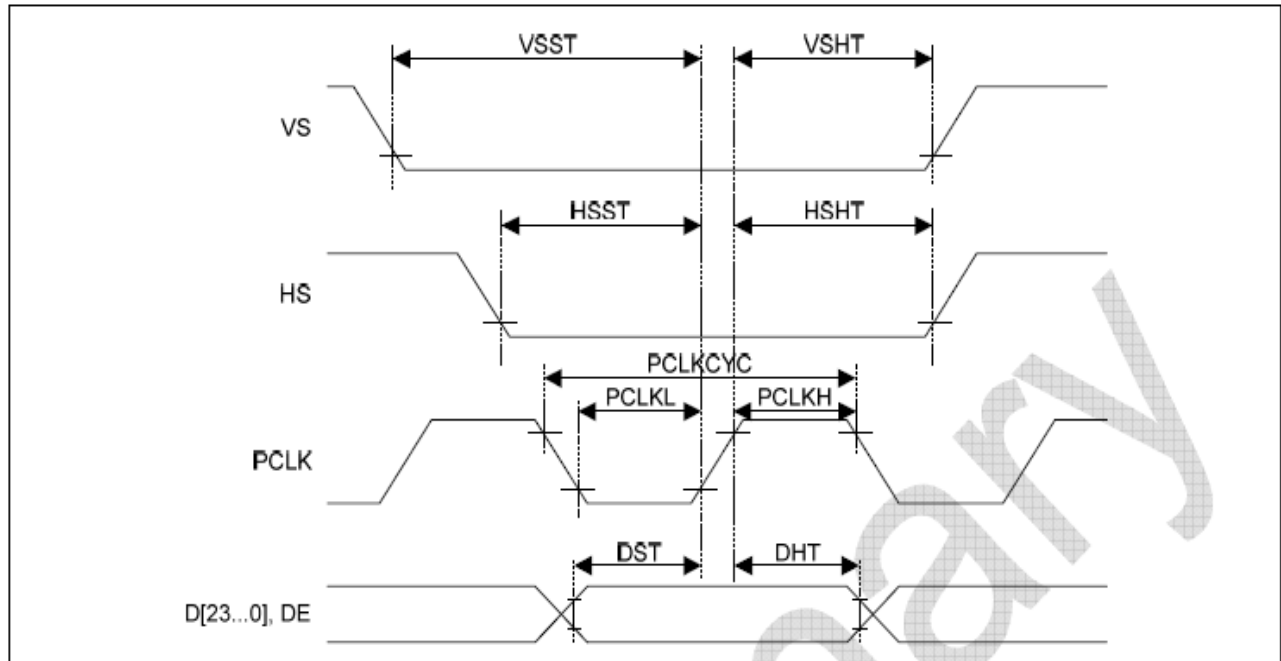
10-2. Reset Timing Characteristics



Signal	Symbol	Parameter	Min	Max	Unit
RESX	t_{RW}	Reset pulse duration	10	-	us
	t_{RT}	Reset cancel	-	5 (note 5)	ms
			-	120 (note 6, 7)	ms

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10-3. RGB Interface Timing Characteristics



Ta = -30 ~ +70°C, VDD3 = 1.65 ~ 3.3V, VDD = 2.5 ~ 3.3V

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical sync. Setup time	VSST		10			ns
Vertical sync. Hold time	VSHT		10			ns
Horizontal sync. Setup time	HSST		10			ns
Horizontal sync. Hold time	HSHT		10			ns
Pixel clock cycle when VISS is running	PCLKCYC	VRR = Min.50Hz Max.65Hz	39 ⁽³⁾			ns
Pixel clock low time	PCLKL		10			ns
Pixel clock high time	PCLKH		10			ns
Data setup time D[23...0]	DST		10			ns
Data hold time D[23...0]	DHT		10			ns

Note 1: Signal rise and fall times are equal or less than 20ns.

Note 2: Measuring of input signals is using 0.30 x VDD3 for low state and 0.70 x VDD3 for high state.

Note 3: 22 MHz

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11. Quality Level

11-1. Environment Condition

The environmental conditions for inspection shall be as follows.

① Temperature & Humidity

Room temperature : $22 \pm 3^{\circ}\text{C}$

Humidity : $65 \pm 20\%\text{RH}$

② Viewing distance : $30 \pm 5\text{cm}$

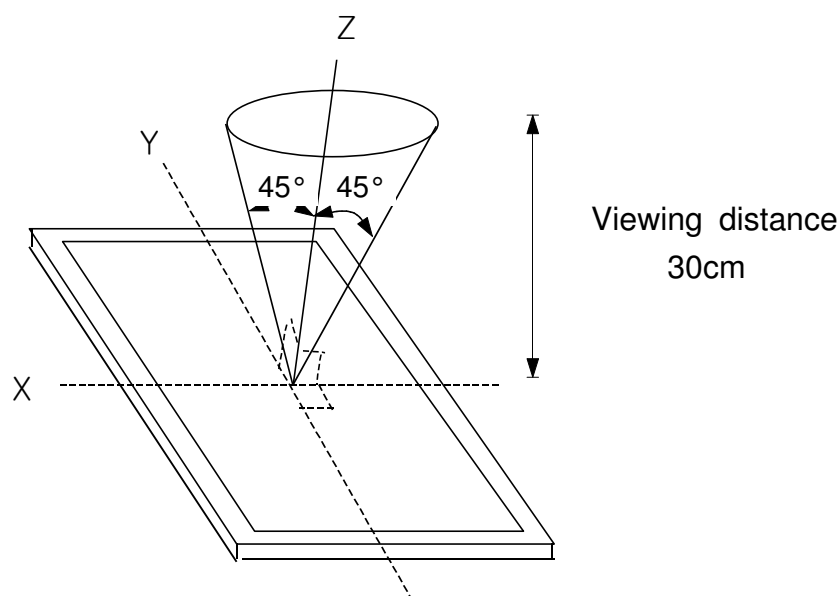
Viewing angle(tolerance) : $90^{\circ} \pm 45^{\circ}$

③ Ambient light

Display visual inspection : $150 \pm 50 \text{ lux}$

Cosmetic inspection : $800 \sim 1200 \text{ lux}$

④ Inspection pattern : White, R, G, B, Black, Gray($100\text{cd}/\text{m}^2$)



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11-2. Sampling Procedures for each item's acceptance table

Defect type	Sampling Procedures	AQL
Major Defect	MIL-STD-105D Inspection level I normal inspection single sample inspection	0.65
Minor Defect	MIL-STD-105D Inspection level I normal inspection single sample inspection	1.5

① Major defect

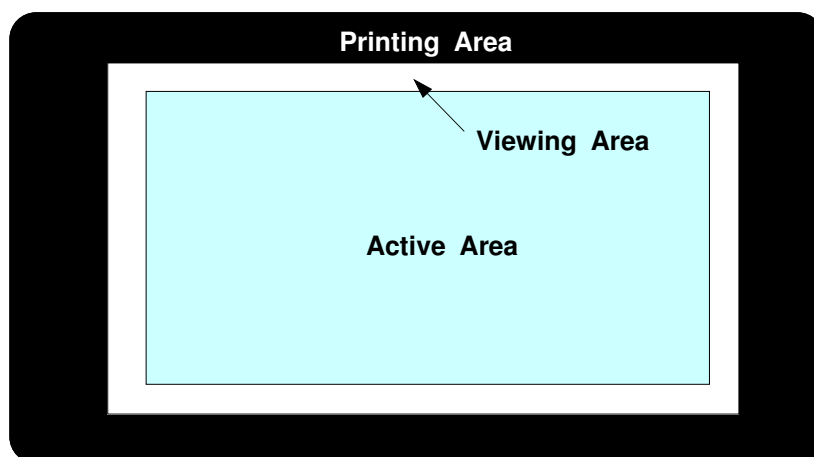
: A major defect refers to a defect which may substantially degrade usability for product applications.

② Minor defect

: A minor defects refers to a defect which is not considered to substantially degrade product application, or a defect which deviates from existing standards almost unrelated to the effective use of the product or its operation.

③ Determination of inspection area : Active Area + Viewing Area

Defect in "Out of Viewing Area" Zone should not be judged.



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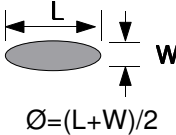
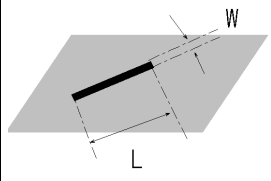
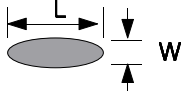
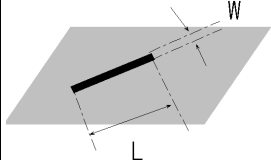
Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

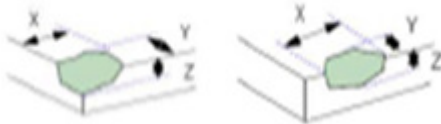



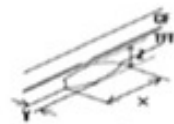
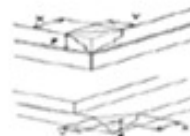
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11-3. Inspection Item

No.	Item	Criterion of Defect	Type																								
1	No Display	disallowance	Major																								
2	Irregular operating	disallowance	Major																								
3	Dot Defect	<table><tr><th colspan="2">Acceptable number</th></tr><tr><td>Dark Dot</td><td>Bright Dot</td></tr><tr><td>2</td><td>0</td></tr></table> <div>- Dark Dot is Red or Blue</div> <div>- Distance ≤ 20mm</div>	Acceptable number		Dark Dot	Bright Dot	2	0	Minor																		
Acceptable number																											
Dark Dot	Bright Dot																										
2	0																										
4	<div>Polarizer + Window dent</div> <div></div> <div>Ø=(L+W)/2</div>	<table><tr><th>Size Ø (mm)</th><th>Acceptable</th></tr><tr><td>Ø ≤ 0.10</td><td>Ignore</td></tr><tr><td>0.10 < Ø</td><td>0</td></tr></table>	Size Ø (mm)	Acceptable	Ø ≤ 0.10	Ignore	0.10 < Ø	0	Minor																		
Size Ø (mm)	Acceptable																										
Ø ≤ 0.10	Ignore																										
0.10 < Ø	0																										
5	<div>Scratch on Window (Line shape)</div> <div></div>	<table><tr><th>Width (mm)</th><th>Length (mm)</th><th>Acceptable</th></tr><tr><td>W≤0.03</td><td>Ignore</td><td>Ignore</td></tr><tr><td rowspan="2">0.03 < W≤0.05</td><td>L≤2.0</td><td>Ignore</td></tr><tr><td>2.0< L≤4.0</td><td>1</td></tr><tr><td rowspan="3">0.05 < W≤0.08</td><td>4.0<L</td><td>0</td></tr><tr><td>L≤1.0</td><td>Ignore</td></tr><tr><td>1.0< L≤4.0</td><td>1</td></tr><tr><td rowspan="2">0.05 < W≤0.08</td><td>4.0<L</td><td>0</td></tr><tr><td colspan="2">W>0.08</td><td>Apply to dent spec.(#4)</td></tr></table>	Width (mm)	Length (mm)	Acceptable	W≤0.03	Ignore	Ignore	0.03 < W≤0.05	L≤2.0	Ignore	2.0< L≤4.0	1	0.05 < W≤0.08	4.0<L	0	L≤1.0	Ignore	1.0< L≤4.0	1	0.05 < W≤0.08	4.0<L	0	W>0.08		Apply to dent spec.(#4)	Minor
Width (mm)	Length (mm)	Acceptable																									
W≤0.03	Ignore	Ignore																									
0.03 < W≤0.05	L≤2.0	Ignore																									
	2.0< L≤4.0	1																									
0.05 < W≤0.08	4.0<L	0																									
	L≤1.0	Ignore																									
	1.0< L≤4.0	1																									
0.05 < W≤0.08	4.0<L	0																									
	W>0.08		Apply to dent spec.(#4)																								
6	<div>Foreign Material</div> <div></div> <div>Ø=(L+W)/2</div>	<table><tr><th>Size Ø (mm)</th><th>Acceptable</th></tr><tr><td>Ø ≤ 0.10</td><td>Ignore</td></tr><tr><td>0.10 < Ø≤0.20</td><td>3</td></tr><tr><td>0.20 < Ø</td><td>0</td></tr></table> <div>- For the Ø ≤ 0.10, foreign material cluster is using the limited sample when it is happened.</div>	Size Ø (mm)	Acceptable	Ø ≤ 0.10	Ignore	0.10 < Ø≤0.20	3	0.20 < Ø	0	Minor																
Size Ø (mm)	Acceptable																										
Ø ≤ 0.10	Ignore																										
0.10 < Ø≤0.20	3																										
0.20 < Ø	0																										
7	<div>Foreign Material</div> <div></div>	<table><tr><th>Width (mm)</th><th>Length (mm)</th><th>Acceptable</th></tr><tr><td>W≤0.03</td><td>Ignore</td><td>Ignore</td></tr><tr><td rowspan="3">0.03 < W≤0.06</td><td>L≤1.0</td><td>2</td></tr><tr><td>1.0≤L<2.0</td><td>1</td></tr><tr><td>2.0<L</td><td>0</td></tr></table>	Width (mm)	Length (mm)	Acceptable	W≤0.03	Ignore	Ignore	0.03 < W≤0.06	L≤1.0	2	1.0≤L<2.0	1	2.0<L	0	Minor											
Width (mm)	Length (mm)	Acceptable																									
W≤0.03	Ignore	Ignore																									
0.03 < W≤0.06	L≤1.0	2																									
	1.0≤L<2.0	1																									
	2.0<L	0																									
8	Surface Stain	Stain which can not clean on the display surface by using soft cloth and wiping gently.	Minor																								

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No.	Item	Criterion of Defect	Type																														
9	Window Crack	Not Acceptable	Minor																														
10	Window Chipping	<div></div> <table><tr><th>Location</th><th>X</th><th>Y</th><th>Z</th></tr><tr><td>Front</td><td>$X \leq 1.0$</td><td>$Y \leq 0.35$</td><td></td></tr><tr><td>Corner / Side / Bottom</td><td>$X \leq 0.6$</td><td>$Y \leq 0.16$</td><td>$Z \leq 1/2t$</td></tr><tr><td>Acceptance Number</td><td colspan="3">Total 2</td></tr></table>	Location	X	Y	Z	Front	$X \leq 1.0$	$Y \leq 0.35$		Corner / Side / Bottom	$X \leq 0.6$	$Y \leq 0.16$	$Z \leq 1/2t$	Acceptance Number	Total 2			Minor														
Location	X	Y	Z																														
Front	$X \leq 1.0$	$Y \leq 0.35$																															
Corner / Side / Bottom	$X \leq 0.6$	$Y \leq 0.16$	$Z \leq 1/2t$																														
Acceptance Number	Total 2																																
11	OLED Chipping	<div><table><tr><th>Z</th><th>X</th><th>Y</th></tr><tr><td>$\leq t$</td><td>$\leq 5.0\text{mm}$</td><td>$\leq 0.4\text{mm}$</td></tr></table></div> <div><table><tr><th>Z</th><th>X</th><th>Y</th></tr><tr><td>$\leq t$</td><td>$\leq 5.0\text{mm}$</td><td>$\leq 0.6\text{mm}$</td></tr></table></div> <div><table><tr><th>Z</th><th>X</th><th>Y</th></tr><tr><td>$\leq t$</td><td>$\leq 5.0\text{mm}$</td><td>$\leq 0.6\text{mm}$</td></tr></table></div> <div><table><tr><th>Z</th><th>X</th><th>Y</th></tr><tr><td>$\leq t$</td><td>$\leq 2.0\text{mm}$</td><td>$\leq 0.5\text{mm}$</td></tr></table></div> <div><table><tr><th>Z</th><th>X</th><th>Y</th></tr><tr><td>$\leq t$</td><td>$\leq 1.0\text{mm}$ $\leq 2.0\text{mm}$</td><td>$\leq 1.0\text{mm}$ $\leq 1.2\text{mm}$</td></tr></table></div>	Z	X	Y	$\leq t$	$\leq 5.0\text{mm}$	$\leq 0.4\text{mm}$	Z	X	Y	$\leq t$	$\leq 5.0\text{mm}$	$\leq 0.6\text{mm}$	Z	X	Y	$\leq t$	$\leq 5.0\text{mm}$	$\leq 0.6\text{mm}$	Z	X	Y	$\leq t$	$\leq 2.0\text{mm}$	$\leq 0.5\text{mm}$	Z	X	Y	$\leq t$	$\leq 1.0\text{mm}$ $\leq 2.0\text{mm}$	$\leq 1.0\text{mm}$ $\leq 1.2\text{mm}$	Minor
Z	X	Y																															
$\leq t$	$\leq 5.0\text{mm}$	$\leq 0.4\text{mm}$																															
Z	X	Y																															
$\leq t$	$\leq 5.0\text{mm}$	$\leq 0.6\text{mm}$																															
Z	X	Y																															
$\leq t$	$\leq 5.0\text{mm}$	$\leq 0.6\text{mm}$																															
Z	X	Y																															
$\leq t$	$\leq 2.0\text{mm}$	$\leq 0.5\text{mm}$																															
Z	X	Y																															
$\leq t$	$\leq 1.0\text{mm}$ $\leq 2.0\text{mm}$	$\leq 1.0\text{mm}$ $\leq 1.2\text{mm}$																															

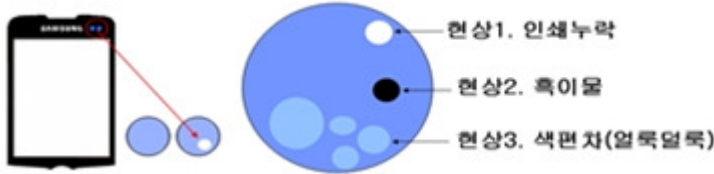
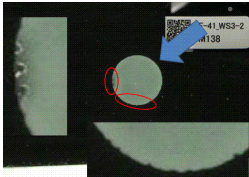
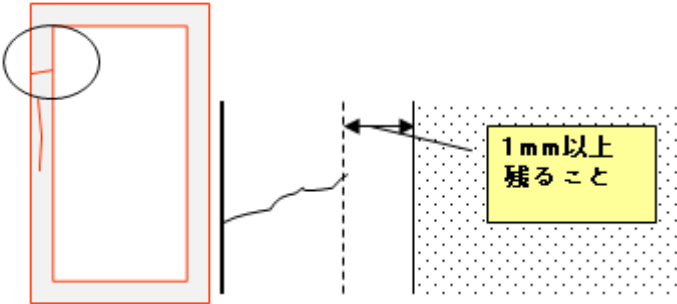
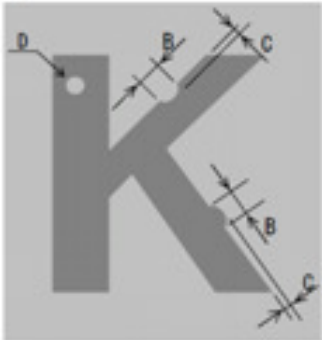
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No.	Item	Criterion of Defect	Type																
12	Window IR	<div></div> <table><thead><tr><th>Item</th><th>Size Ø (mm)</th><th>Acceptable</th></tr></thead><tbody><tr><td>Printing</td><td>Ø ≤ 0.15</td><td>1</td></tr><tr><td rowspan="2">Black Foreign Material</td><td>Ø ≤ 0.15</td><td>Ignore</td></tr><tr><td>0.15 < Ø ≤ 0.20</td><td>1</td></tr><tr><td rowspan="2">Color Difference</td><td>Ø ≤ 0.4</td><td>Ignore</td></tr><tr><td>0.4 < Ø</td><td>0</td></tr></tbody></table>	Item	Size Ø (mm)	Acceptable	Printing	Ø ≤ 0.15	1	Black Foreign Material	Ø ≤ 0.15	Ignore	0.15 < Ø ≤ 0.20	1	Color Difference	Ø ≤ 0.4	Ignore	0.4 < Ø	0	Minor
Item	Size Ø (mm)	Acceptable																	
Printing	Ø ≤ 0.15	1																	
Black Foreign Material	Ø ≤ 0.15	Ignore																	
	0.15 < Ø ≤ 0.20	1																	
Color Difference	Ø ≤ 0.4	Ignore																	
	0.4 < Ø	0																	
13	Window Camera Hole	<p>D ≤ 0.15mm : Acceptable</p> 	Minor																
14	Window BM Back Side	<p>6mm ≤ L : Disallowed foreign material More than 1mm from viewing area</p> 	Minor																
15	Window LOGO	<p>注 (6) ロゴ部</p>  <ul style="list-style-type: none">・文字縮り、文字欠け B : 不問 C : 文字幅の1/5以下・文字太り、文字にじみ B : 不問 C : 文字幅の1/5以下・ピンホール Ø ≤ 0.15 (1文字に1箇所以内の事)・ロゴ傾き : ±0.3	Minor																

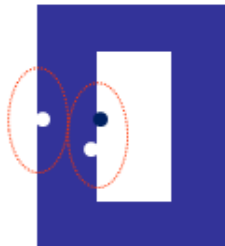
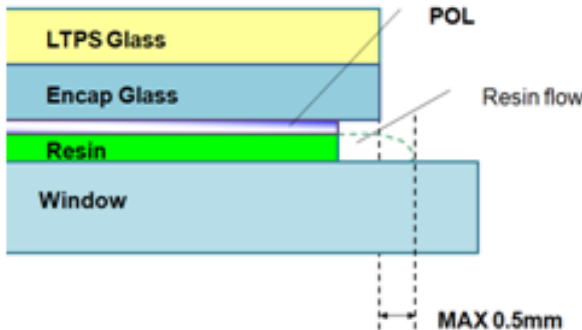
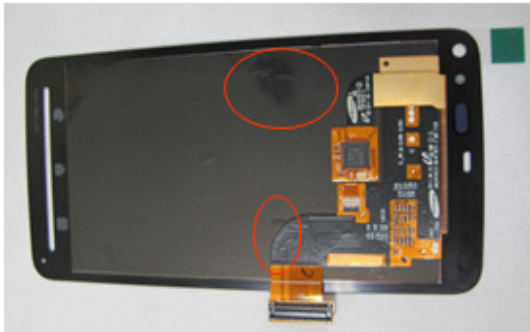
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No.	Item	Criterion of Defect	Type									
16	Window Printing	<div></div> <table><tr><th>Location</th><th>X</th><th>Y</th></tr><tr><td>Inside</td><td colspan="2">Ø ≤ 0.2mm : Acceptable</td></tr><tr><td>Outside</td><td colspan="2">Ø ≤ 0.2mm : Acceptable</td></tr></table>	Location	X	Y	Inside	Ø ≤ 0.2mm : Acceptable		Outside	Ø ≤ 0.2mm : Acceptable		Minor
Location	X	Y										
Inside	Ø ≤ 0.2mm : Acceptable											
Outside	Ø ≤ 0.2mm : Acceptable											
17	Resin Over Flow	<div><p>$D \leq 0.5\text{mm}$: Acceptable</p></div>	Minor									
18	Black Tape	<div><p>- Air bubble or stain is acceptable, but not visible in front side.</p></div>	Minor									
19	FPC	<div><ol style="list-style-type: none">1. Crack : Disallowed2. Dent : Disallowed if Cu layer is exposed3. Scratch : Disallowed if Cu layer is exposed4. Dimple : Ignore “U” Type5. Oxidation : Disallowed if color is changed by oxidation6. Folding : Disallowed having angle</div>	Minor									

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12. Reliability

12-1. Test item

: All test result of items should be judged in 2 hours recovery time at room temperature.

No	Item	Condition	Qty.	Judgment Criterion
1	High Temperature Operation	70℃ 240hours	6	- After testing, Operation defects & Cosmetic defects should not happen. - The polarizer defect should not be included in judgment under condition of #2, #6, #7
2	High Temperature Storage	85℃ 240hours	6	
3	Low Temperature Operation	-20℃ 240hours	6	
4	Low Temperature Storage	-40℃ 240hours	6	
5	High Temperature Humidity Operation	60℃ 93%RH 240hrs	6	
6	High Temperature Humidity Storage	85℃ 85%RH 240hrs	6	
7	Thermal Shock	-40℃(0.5hr) ↔ 85℃(0.5hr) 100cycle	6	
8	ESD (Non operation)	330Ω, 150pF -Contact : ±6kV 5 points, each 2 times -Air : ±8kV 5 points, each 2 times	6	- No functional defects
9	Vibration (Packing)	Random, 1.047Grms, 6~200Hz Z:60min, X,Y each 30min	32	- No functional defects

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13. Handling Precautions

13-1. Mounting Method

The **AMOLED Panel** of SAMSUNG Mobile Display CO.,LTD. module consists of two slim glasses with polarizer which can easily get damaged. Since the module is constructed as to be fixed by utilizing fitting holes in the printed circuit board. Extreme care should be used when handling the AMOLED modules.

13-2. Caution of AMOLED Handling and Cleaning

When cleaning the display surface, use soft cloth solvent as recommended below and wipe gently.

- ◎ Isopropyl alcohol
- ◎ Ethyl alcohol
- ◎ Trichlorotrifluoroethane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface. Do not use the following solvent.

- ◎ Water
- ◎ Ketone
- ◎ Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns. Do not use the following solvent on the pad and prevent it from being contaminated.

- ◎ HCFC
- ◎ Soldering flux
- ◎ Chlorine(Cl), Sulfur(S)
- ◎ Spittle, Fingerprint

If the product is not wrapped with a desiccant added pad, ITO pattern can be damaged by corrosion. SAMSUNG Mobile Display CO.,LTD. suggests wrapping a product with a desiccant unless customers particularly indicate that they do not want it. In case ITO pattern corrodes due to the usage of chlorine, sulfur or customer's mishandling of the product, the responsibility lies with the customer.

13-3. Caution Against Static Charge

For AMOLED module, use C-MOS LSI drivers, therefore we recommend that you ;
Connect any unused input terminal to VDD or VSS, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity. It could occur static electricity when taping off the film which protects AMOLED.
Against static charge, you should make sure that the product is safe or not by experiment in advance.

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13-4. Packing

- ◎ The packing principle is that AMOLED module should keep its packing condition at the time of delivery. When storing the AMOLED after unpacking, note the followings.
- ◎ AMOLED module is consisted of GLASS and assemblies. It should avoid pressure, strong impact, and being dropped from a height.
- ◎ To prevent modules from degradation, do not operate or store them in a place where they are directly exposed to sunlight or high temperature/humidity.

13-5. Caution for Operation

- ◎ If you do not follow normal POWER ON , OFF sequence or abnormal operating, then AMOLED module can be damaged Electro-optically and does not recover.
- ◎ Response time may extremely delay at a temperature lower than operating range, AMOLED does not normally operate at a high temperature. But this may recover at a proper temperature.
- ◎ When you set optimal operating voltage to AMOLED module, you can see the optimal contrast of AMOLED. So, add voltage controllable function at SET Module.
- ◎ AMOLED module may not display normally when twisting power or pressing power is added. Therefore you should secure AMOLED module maximum thickness at set assembly not to have any pressure affect AMOLED module.
- ◎ Electro-chemical reaction may occur when there is humidity on pad, therefore, you should use AMOLED Module below maximum operating humidity.
- ◎ AMOLED Module Power Vdd should be designed to protect surge current at SET Module.
- ◎ You should not damage connector and cable for AMOLED module assembly by force folding or by applying extreme power.
- ◎ AMOLED may not display normally when it is interfered by surrounding elements, therefore you should consider setting design not to damage AMOLED module by surrounding elements.
- ◎ To satisfy EMI standards, you should plan your design after considering emitting energy.
- ◎ We can not guarantee display characteristics outside viewing area, therefore your set window should be fixed into viewing area.
- ◎ Image-sticking may occur if AMOLED displays same image for a long time, so you need to make a pattern change for AMOLED.

13-6. Storage

- ◎ Place in a dark place where neither exposure to direct sunlight or any fluorescent light is permitted and keep at room temperature & room humidity.
- ◎ Store with no contact with polarizer surface.
[It is recommended to store them as they have been contained in the inner container when we delivered them.

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13-7. Safety Precautions

- ◎ Disassembly or modification may cause electric shock, damages to sensitive part inside of the AMOLED module, dust adhesion, or scratches on the display part.
- ◎ In the event that the contents of AMOLED module are on skin, wipe them with a paper towel or gauge and wash the part well, and receive medical attention if necessary.
- ◎ Do not use the AMOLED module for the Special purpose besides display units.
- ◎ Be careful of the glass chips that may cause injury to fingers of skin, when the display part is broken.

13-8. Precautions before Use

You should discuss the following case with SAMSUNG Mobile Display CO.,LTD.

- ◎ in case of any questions about contents of this "Specification For Approval".
- ◎ in case of occurring new problems not mentioned at this "Specification For Approval".
- ◎ in case of your request about income inspection Specification change.
- ◎ in case of occurring new problem at your driving test.

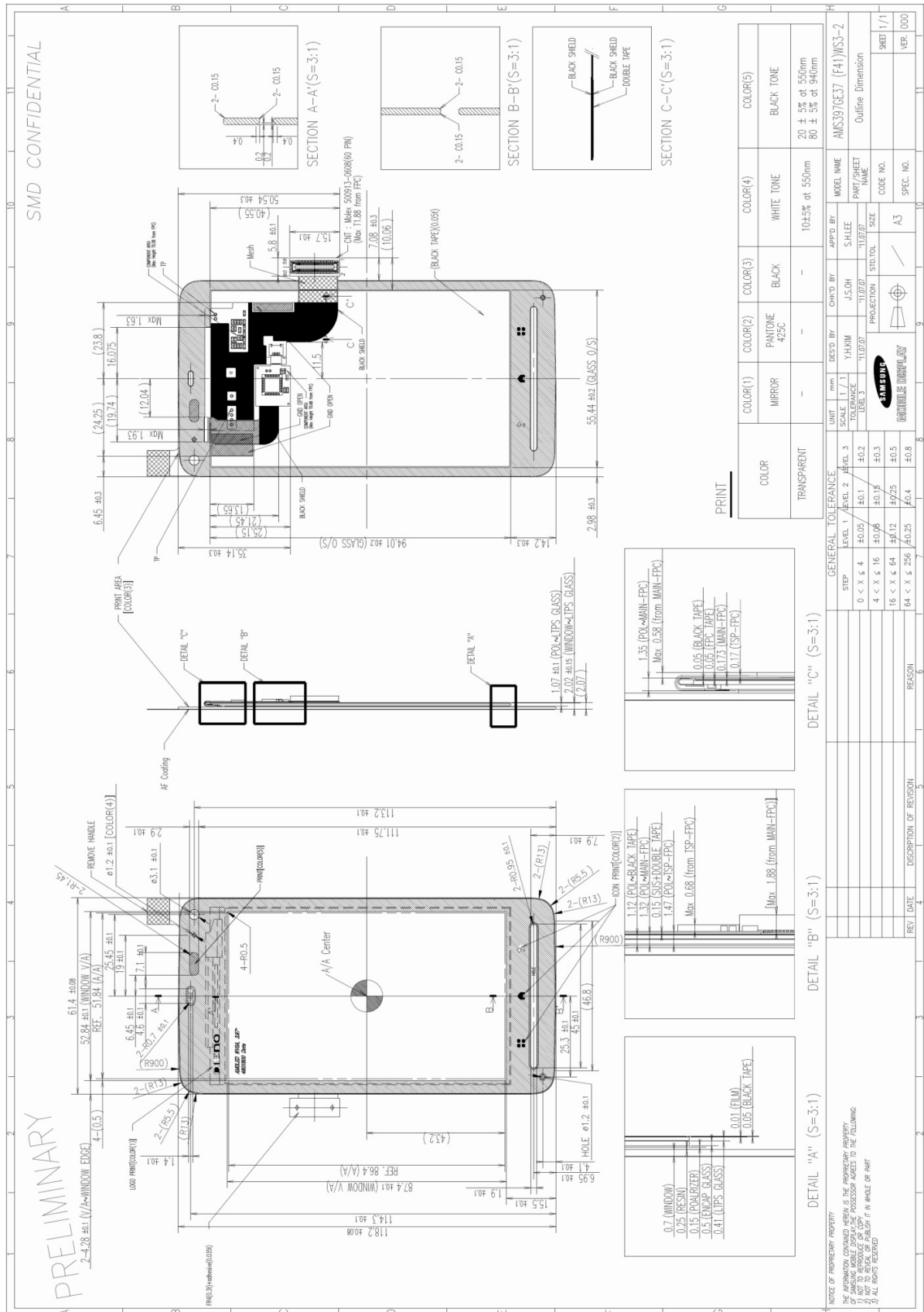
※ If SMD has to change the conditions Specified in the Specification, previously the negotiation shall be held and decided.

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14. Drawing

14-1. Product Drawing



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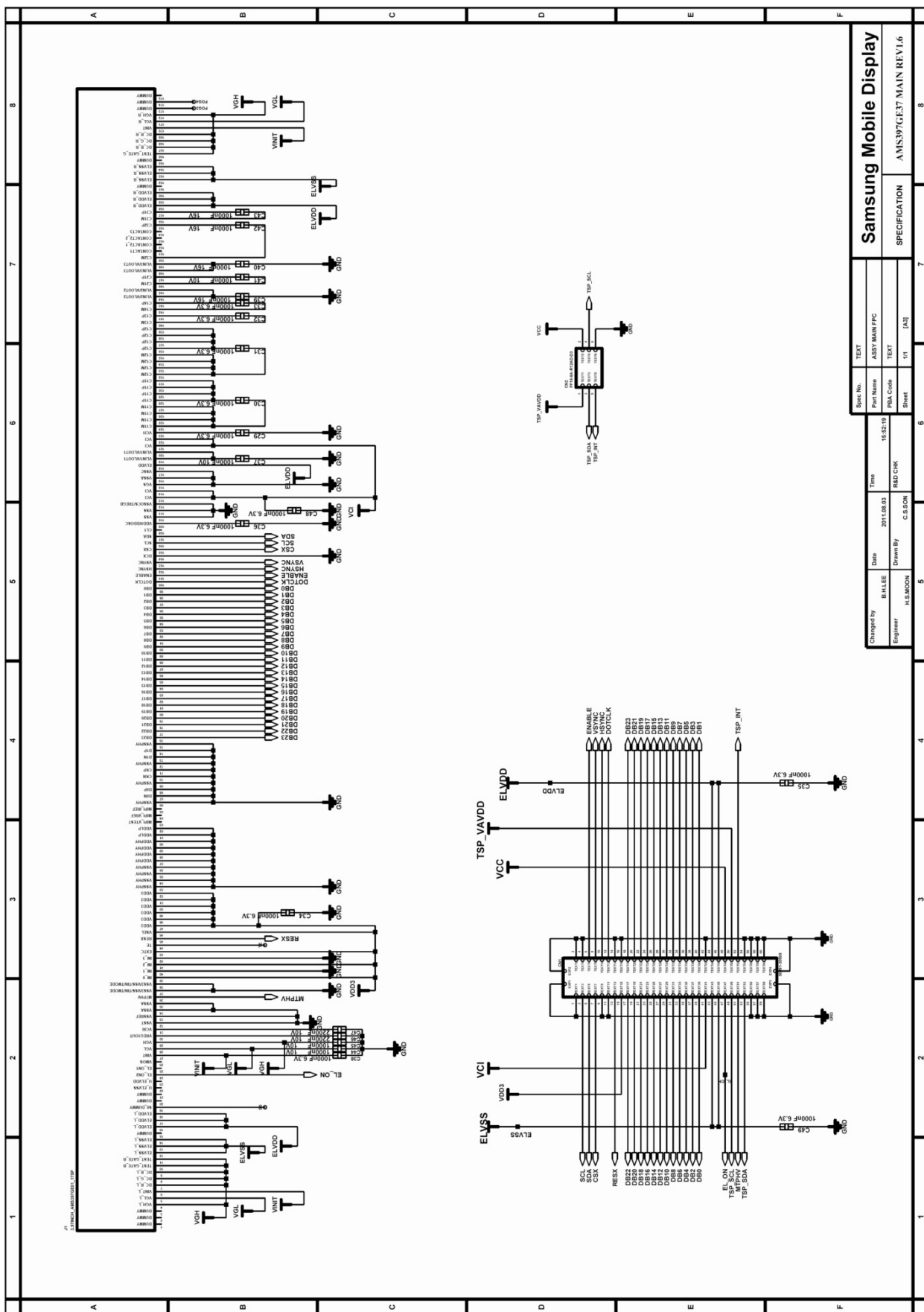
Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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14-1-1. Schematic Diagram



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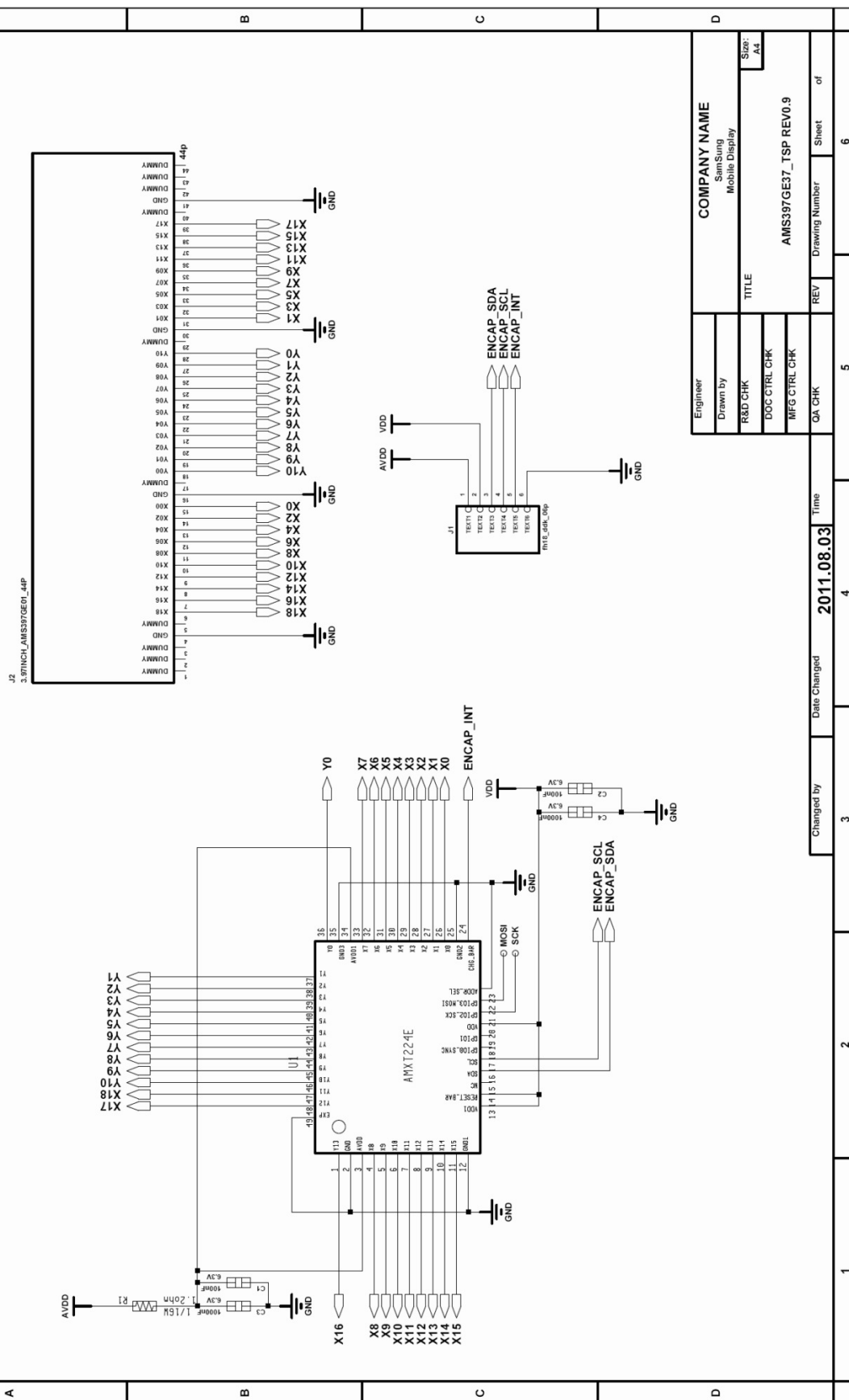
Doc. No.: AMS397GE37

TITLE : 3.97" 480x800, 16M AMOLED

Rev. : 1.0

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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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14-1-2. Partlist

No.	Category	Reference	Specification	Maker
1	C-CER, CHIP	C29~C36, C38, C48, C49	1000nF, 10%, 6.3V, X5R, 1005 Typ. 0.5T, Max. 0.55T	Note #1
2	C-CER, CHIP	C37, C41, C44, C45	1000nF, 10%, 10V, X5R, TP, 1005 Typ. 0.5T, Max. 0.55T	Note #1
3	C-CER, CHIP	C39, C40, C42, C43	1000nF, 10%, 16V, X5R, TP, 1005 Typ. 0.5T, Max. 0.55T	Note #1
4	C-CER, CHIP	C46, C47	2200nF, 10%, 10V, X5R, TP, 1005 Typ. .0.5T, Max. 0.55T	Note #1
5	Touch Connector	CN2	6P, 0.4mm, SMD-A, AU, Y, FLIP, TOP Typ. 0.66T, Max. 0.7T	DDK Note #2
6	Main Connector	CN1	60Pin, 500913-0608 Typ. 1.6T, Max. 1.8T	Molex
7	FPCB Tape	TOP	Sekisui 3805H Typ. 50um, Max. 55um	
8	FPCB Main		2L, AMS397GE37 MFPCB Rev.1.6 Body Typ. 173um, Max. 203um	BHFLEX

Notes

- Solder Cream : SENJU (M706-GRN360-K2-V) Thickness Max. 0.1T
- Note #1 : AVX/Kyocera, Murata, Taiyo Yuden, TDK, SEM
- Note #2 : SMD does not guarantee the damage after shipments.

No.	Category	Reference	Specification	Maker
1	IC	IC1	ATMXT224E, QFN, 48P, 6*6mm, Max. 0.65T	Note #2
2	R-CER, CHIP	R1	1.2 ohm, 5%, 1/16mW, 1005 Typ. 0.5T, Max. 0.55T	SEM, ROHM
3	C-CER, CHIP	C3, C4	1000nF, 10%, 6.3V, X5R, 1005 Typ. 0.5T, Max. 0.55T	Note #2
4	C-CER, CHIP	C1, C2	100nF, 10%, 6.3V, X5R, TP, 1005 Typ. .0.5T, Max. 0.55T	Note #2
7	FPCB Tape		Sekisui 3805H Typ. 50um, Max. 55um	
8	FPCB Main		2L, AMS397GE37 TFPCB Rev.0.9 Body Typ. 173um, Max. 203um	BHFLEX

Notes

- Solder Cream : SENJU (M706-GRN360-K2-V) Thickness Max. 0.1T
- Note #1 : AVX/Kyocera, Murata, Taiyo Yuden, TDK,

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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

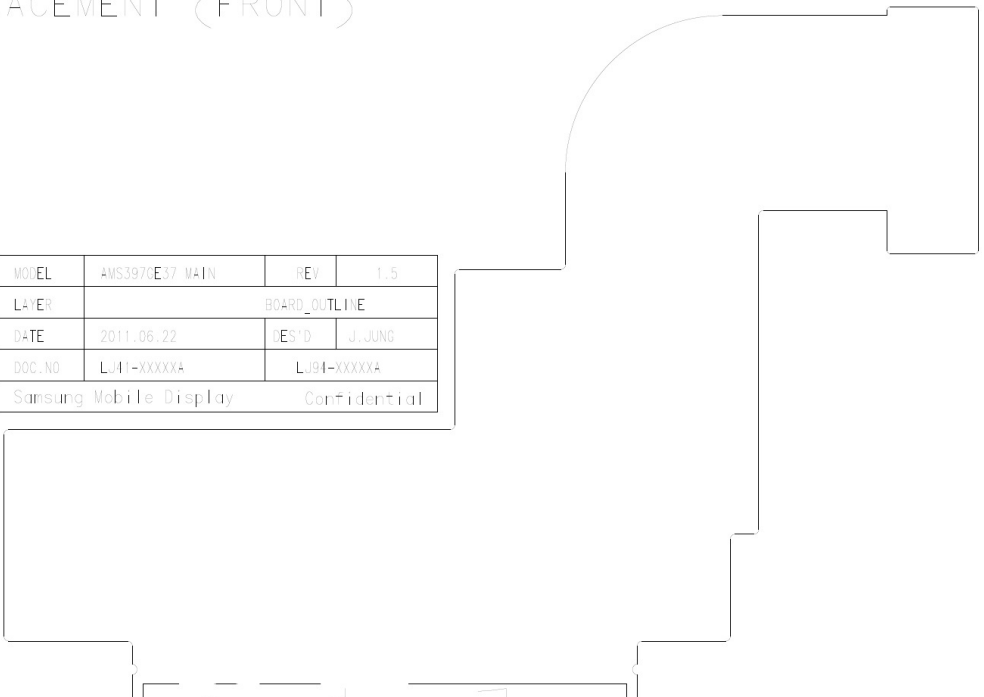
Rev. : 1.0

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14-1-3. Parts Placement

P L A C E M E N T S P E C		DESIGNED	APPROVED
		J. JUNG 2011.06.14	B.H. LEE 2011.06.14

1. PLACEMENT (FRONT)



MODEL	AMS397GE37 MAIN	REV	1.5
LAYER	BOARD_OUTLINE		
DATE	2011.06.22	DES'D	J. JUNG
DOC. NO.	LJ94-XXXXXA	LJ94-XXXXXA	
Samsung Mobile Display		Confidential	

NOTE	▲ TEXT
	▲ TEXT
	▲ TEXT

SAMSUNG SMD CO., LTD. (All Rights Reserved)			
DOC. NO: LJ94-XXXXXA	Model : KYOCERA MAIN	REV 1.4	PAGE 1/2

SAMSUNG Mobile Display CO., LTD.(All Rights Reserved).

Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	7/53
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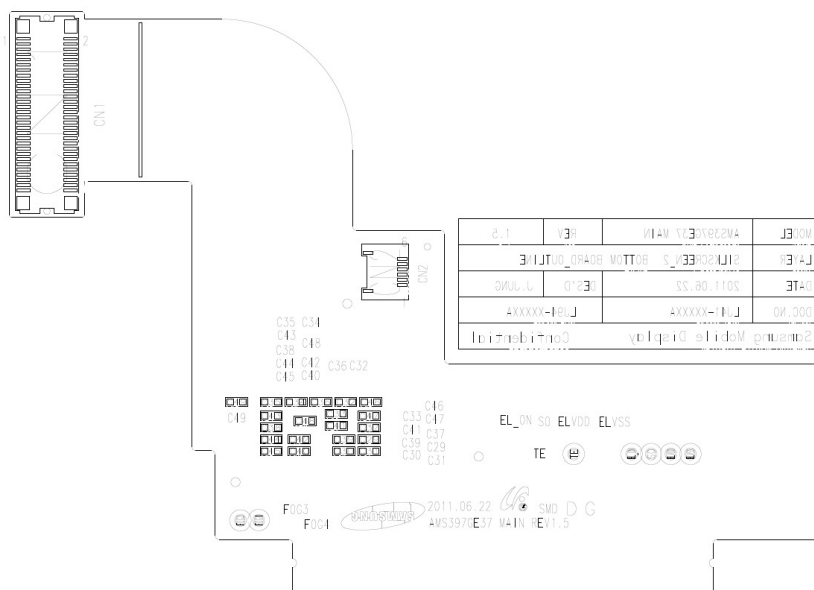
PLACEMENT SPEC

DESIGNED

APPROVED

B.H.LEE
2011.06.14

1. PLACEMENT (REAR)



NOTE

	TEXT
---	------

2 TEXT

3 TEXT

SAMSUNG SMD CO., LTD. (All Rights Reserved)

DOC. NO: LJ94-XXXXXA

Model : KYOCERA MAIN

REV 1.4

PAGE 2/2

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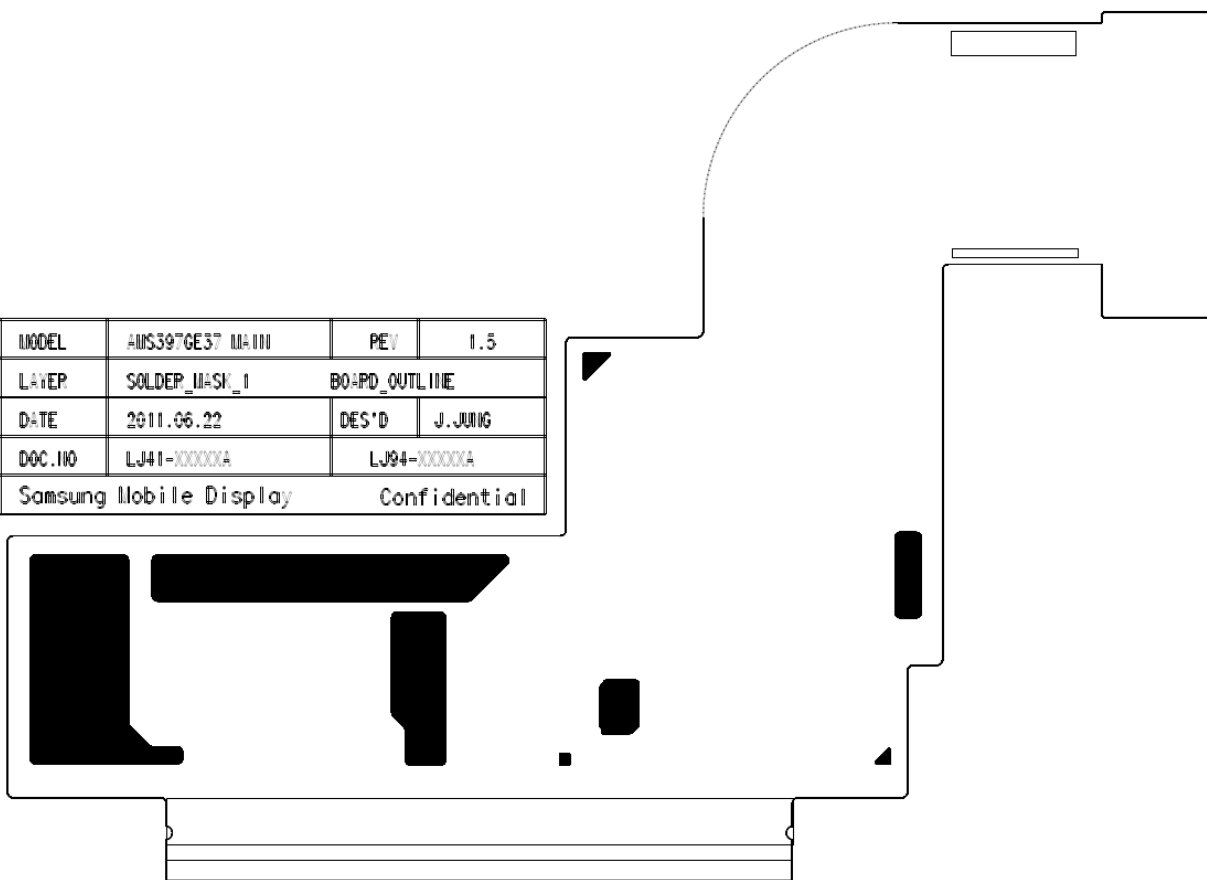
Doc. No.: AMS397GE37

TITLE : 3.97" 480x800, 16M AMOLED

Rev. : 1.0

37/53

MODEL	AMS397GE37 M1111	REV	1.5
LAYER	SOLDER_MASK_1	BOARD_OUTLINE	
DATE	2011.06.22	DES'D	J.JUNG
DOC.NO	LJ41-XXXXXA	LJ94-XXXXXA	
Samsung Mobile Display		Confidential	



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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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MODEL	AMS397GE37 MAIN	REV	1.5
LAYER	BLACK_SHIELD_1	BOARD_OUTLINE	
DATE	2011.06.22	DES'D	J.JUNG
DOC.NO	LJ41-XXXXXA	LJ94-XXXXXA	
Samsung Mobile Display		Confidential	

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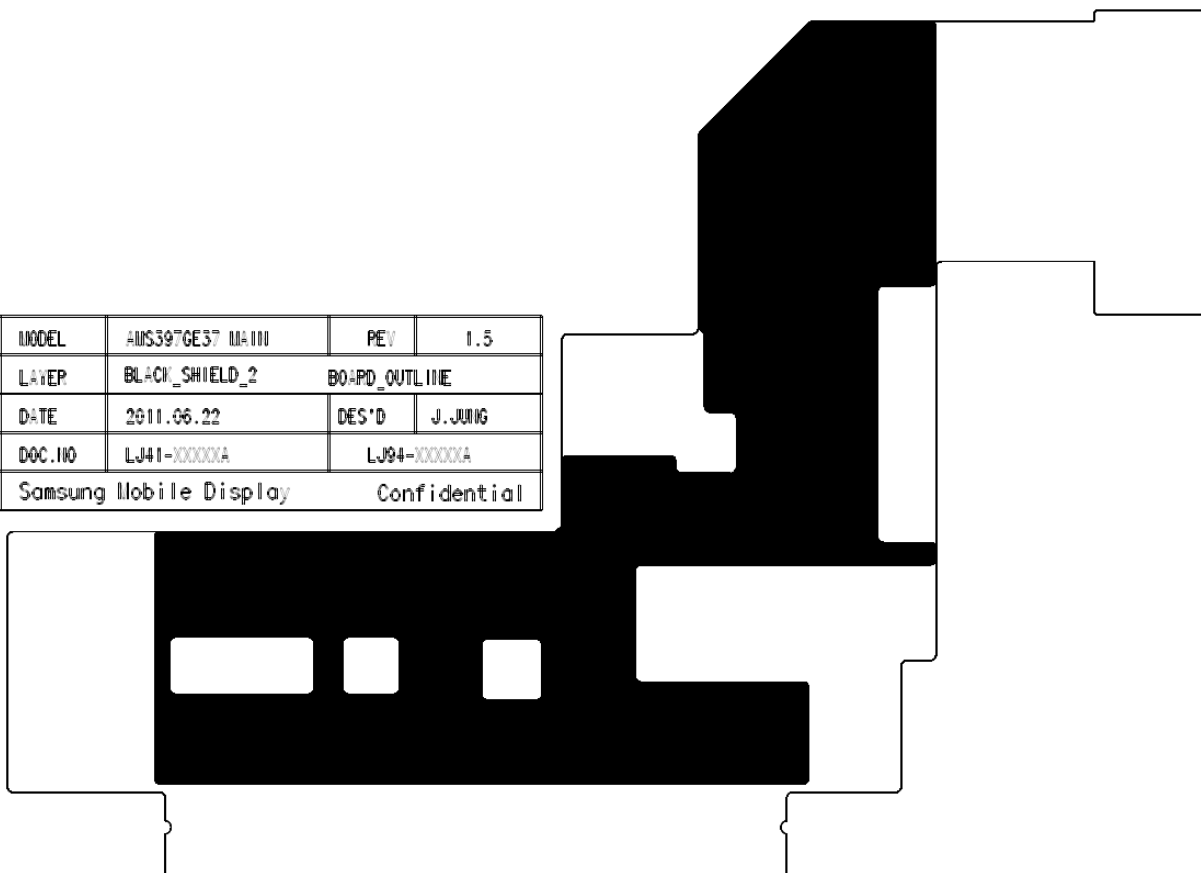
Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

39/53

MODEL	AMS397GE37 MAIN	REV	1.5
LAYER	BLACK_SHIELD_2	BOARD_OUTLINE	
DATE	2011.06.22	DES'D	J.JUNG
DOC. NO	LJ41-XXXXXXA	LJ94-XXXXXXA	
Samsung Mobile Display		Confidential	



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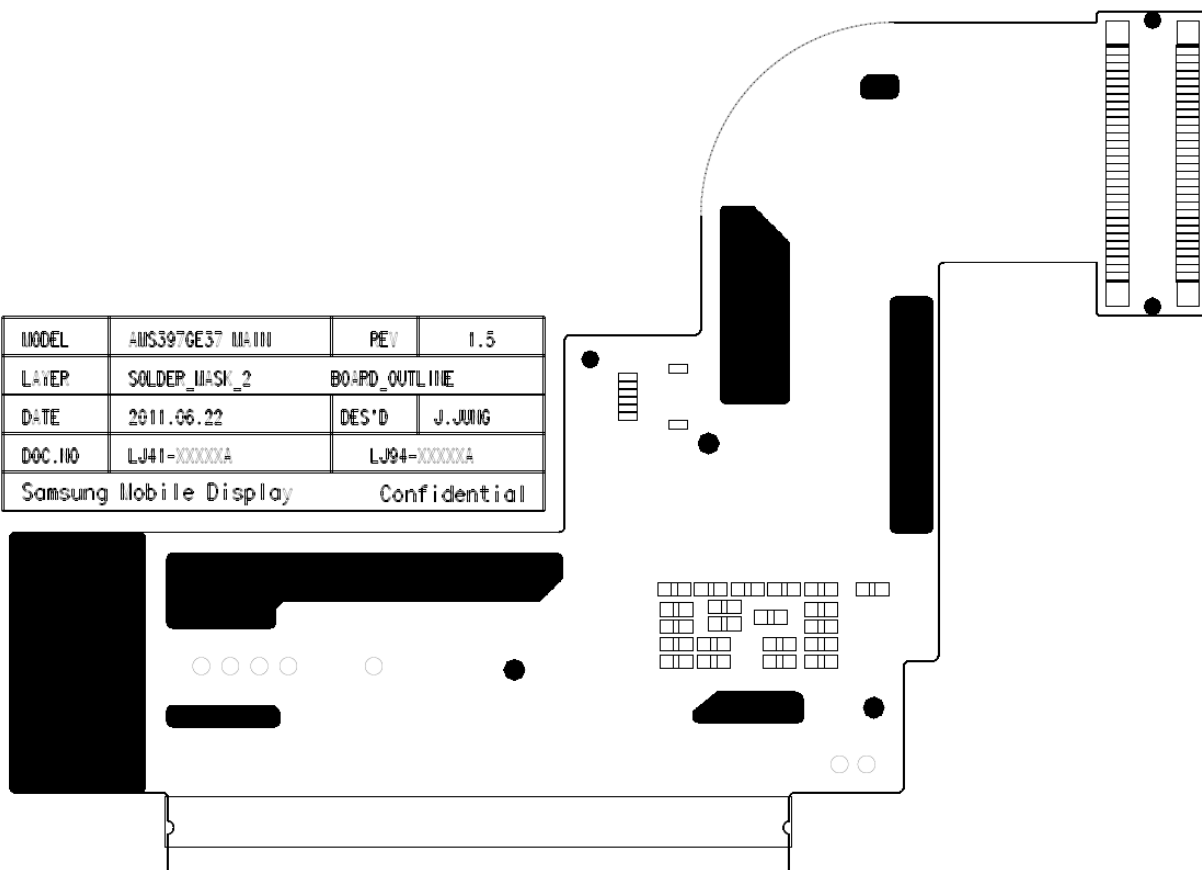
Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

40/53

MODEL	AMS397GE37 MAIN	REV	1.5
LAYER	SOLDER_MASK_2	BOARD_OUTLINE	
DATE	2011.06.22	DES'D	J. JUNG
DOC. NO	LJ41-XXXXXA	LJ94-XXXXXA	
Samsung Mobile Display		Confidential	



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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

41/53

MODEL	AMS397GE37 MAIN	REV	1.5
LAYER	SILISCREEN_1	BOARD_OUTLINE	
DATE	2011.06.22	DES'D	J.JUNG
DOC.NO	LJ41-XXXXXA	LJ94-XXXXXA	
Samsung Mobile Display		Confidential	

J11

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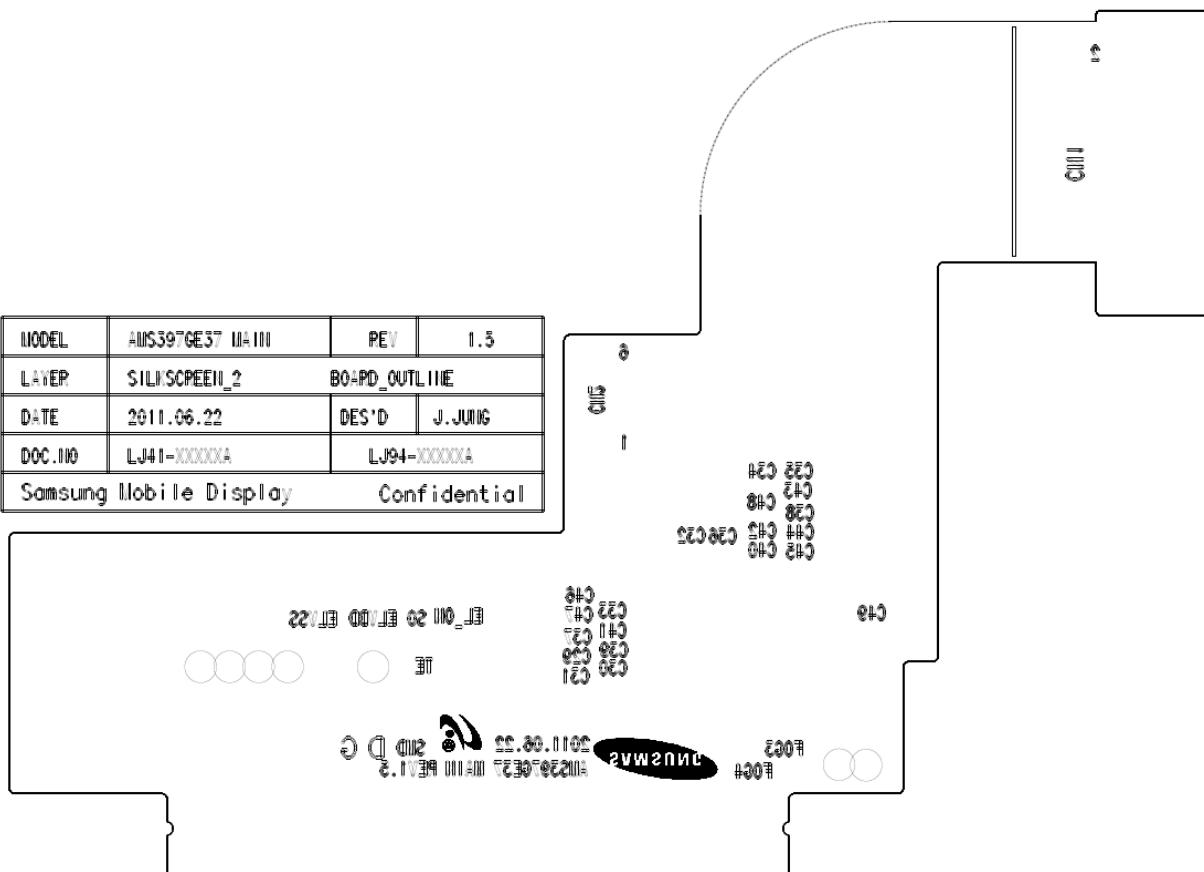
Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

42/53

MODEL	AMS397GE37 MAIN	REV	1.3
LAYER	SILKSCREEN_2	BO+PD_OUTLINE	
DATE	2011.06.22	DES'D	J.JUNG
DOC. NO	LJ41-XXXXXA	LJ94-XXXXXA	
Samsung Mobile Display		Confidential	



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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

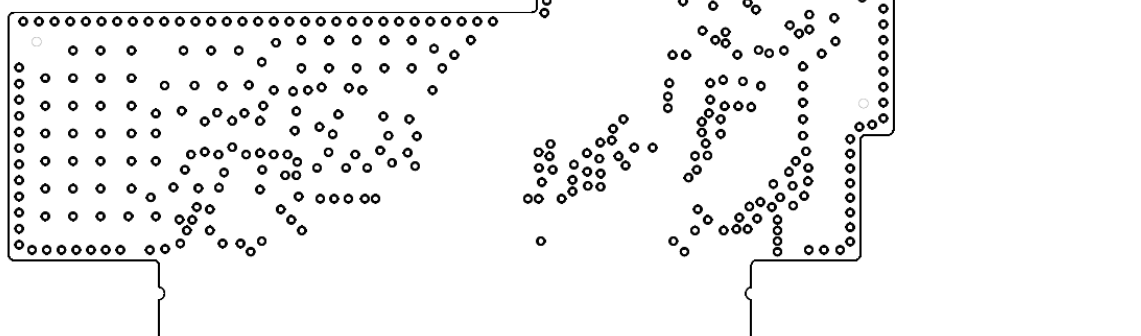
Rev. : 1.0

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BOARD's DRILL SCHEDULE

DRILL SYMBOL	DRILL SIZE	COUNT	PLATED	Min/Max
●	0.25	518	YES	---
○	1.1	2	NO	---

MODEL	AMS397GE37 11A111	REV	1.5
LAYER	DRILL	BOARD_OUTLINE	
DATE	2011.06.22	DES'D	J.JUNG
DOC.NO	LJ41-XXXXXA	LJ94-XXXXXA	
Samsung Mobile Display		Confidential	



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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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MODEL	AMS397GE37 MAIN	REV	1.5
LAYER	BOARD_OUTLINE		
DATE	2011.06.22	DES'D	J. JUNG
DOC. NO	LJ41-XXXXXA	LJ94-XXXXXA	
Samsung Mobile Display		Confidential	

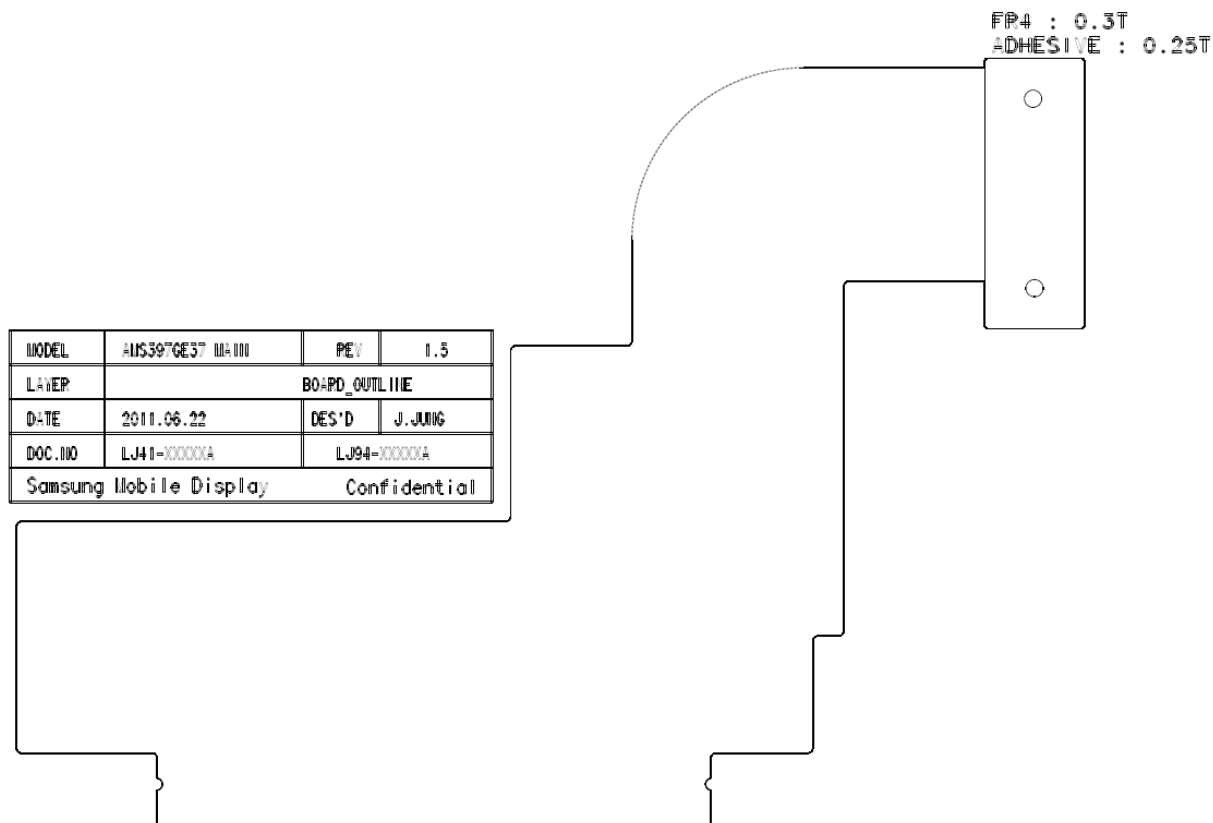
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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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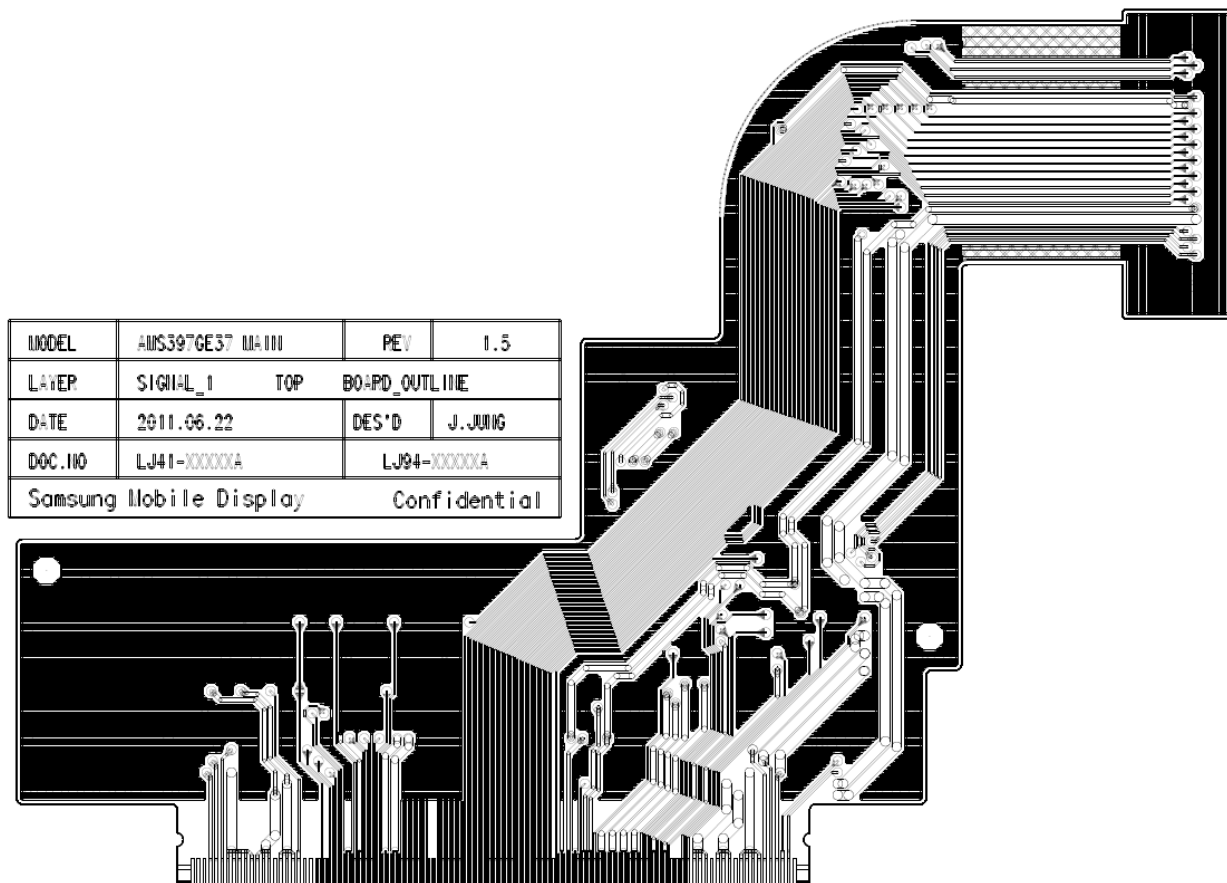
SAMSUNG Mobile Display CO., LTD.(All Rights Reserved).

Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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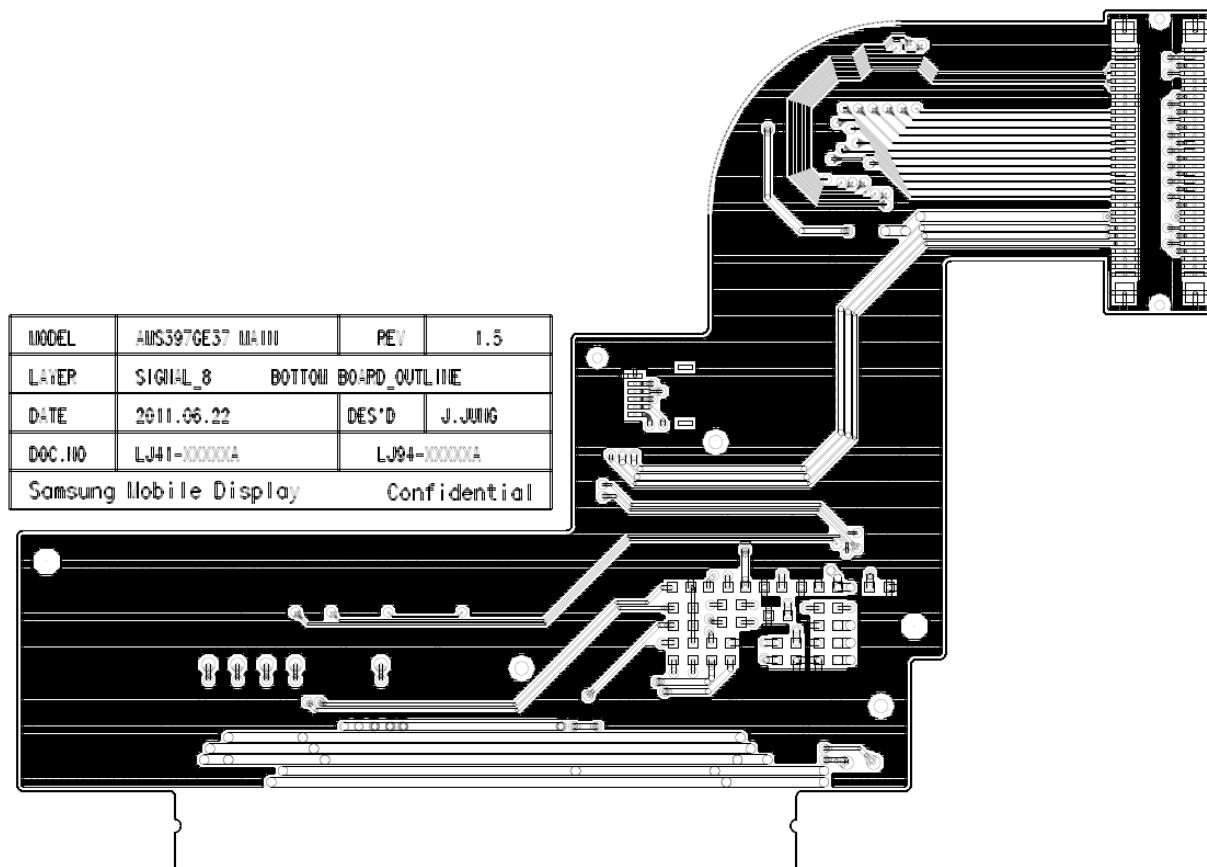
SAMSUNG Mobile Display CO., LTD.(All Rights Reserved).

Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

48/53

P L A C E M E N T S P E C

DESIGNED

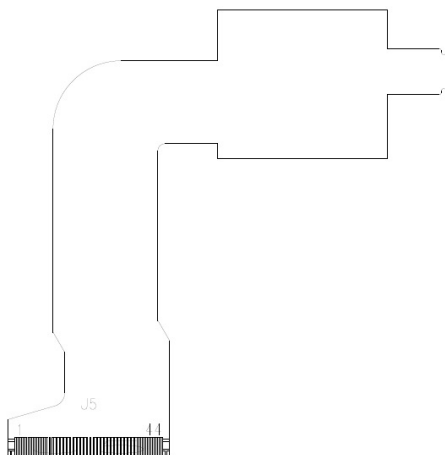
APPROVED

G.Y.BAEK
2011.07.06B.H.LEE
2011.07.06

1. PLACEMENT (FRONT)

Confidential

Confidential



MODEL	AMS397GE37 TSP	REV	0.8
LAYER	SILKSCREEN_1		
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

NOTE

△ TEXT

△ TEXT

△ TEXT

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DOC. NO: LJ94-XXXXXA

AMS397GE37 TSP

REV 0.8

PAGE 1/2

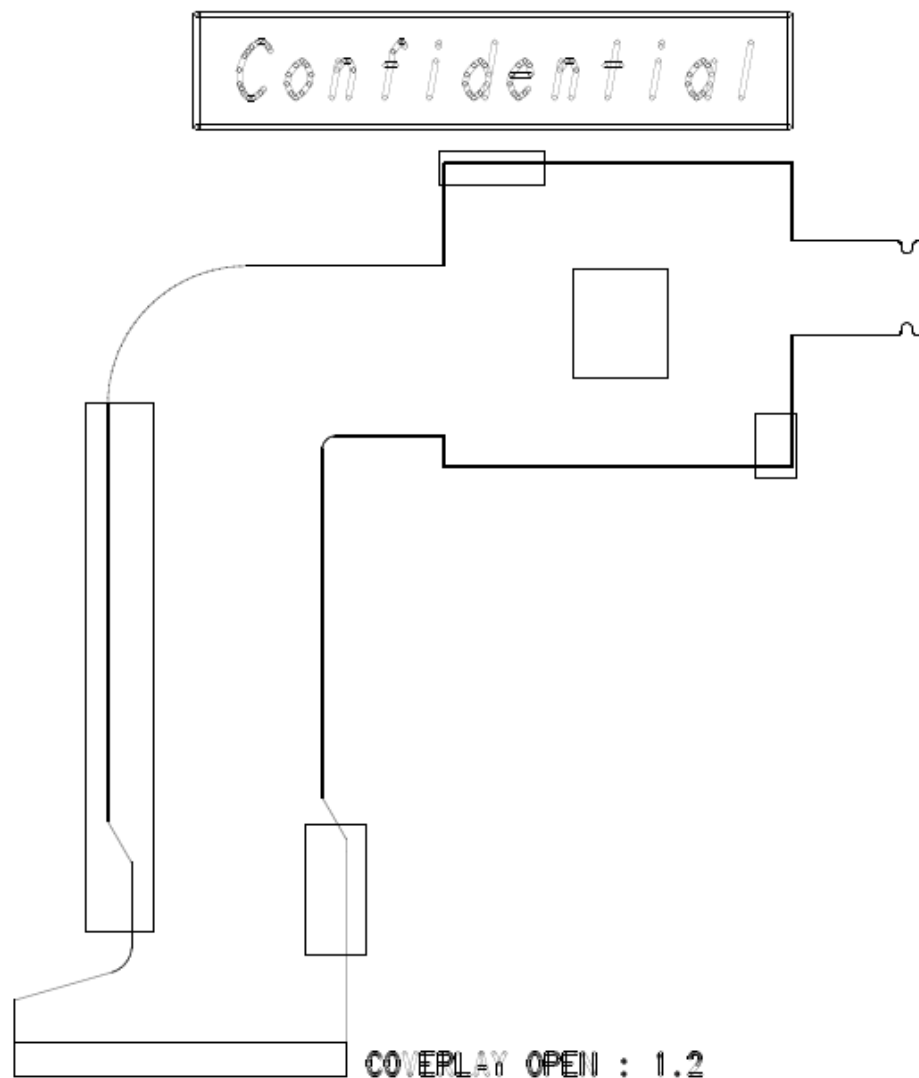
SAMSUNG Mobile Display CO., LTD.(All Rights Reserved).

Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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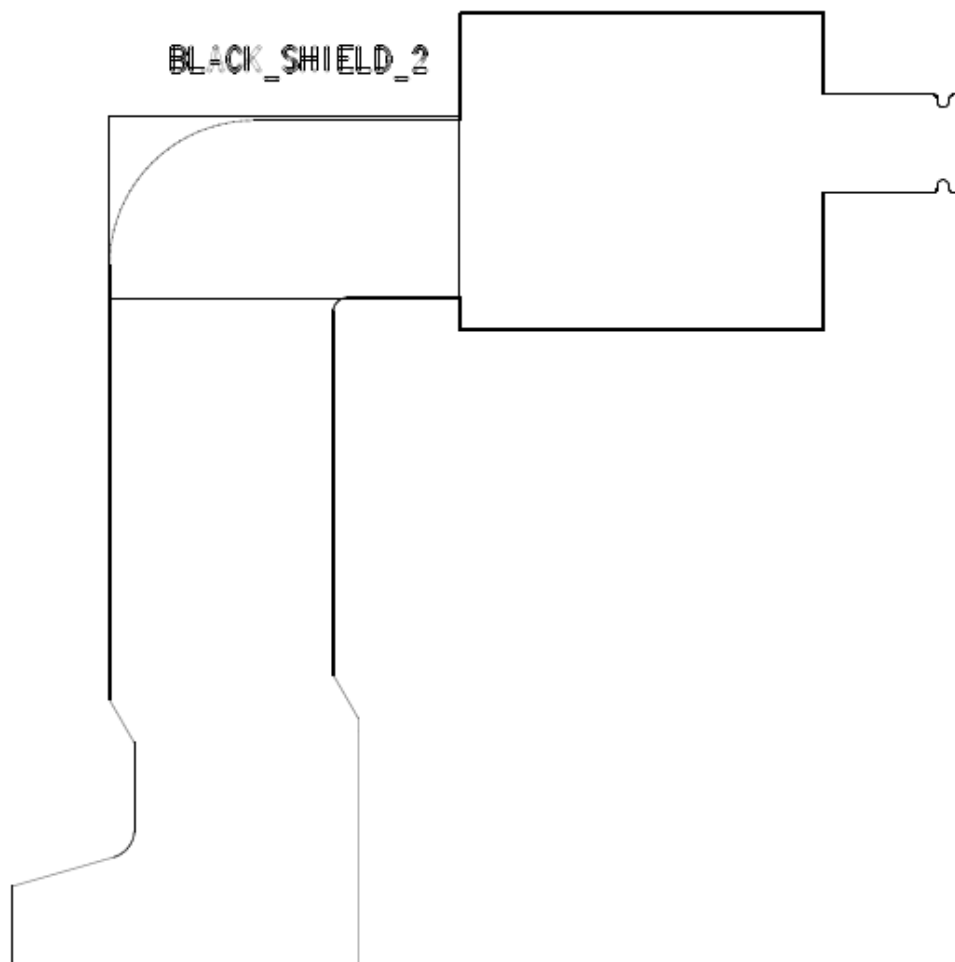
MODEL	AMS397GE37 TSP	REV	0.8
LAYER	SOLDER_MASK_1		
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

SAMSUNG Mobile Display CO., LTD.(All Rights Reserved).

Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	51/53
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Confidential

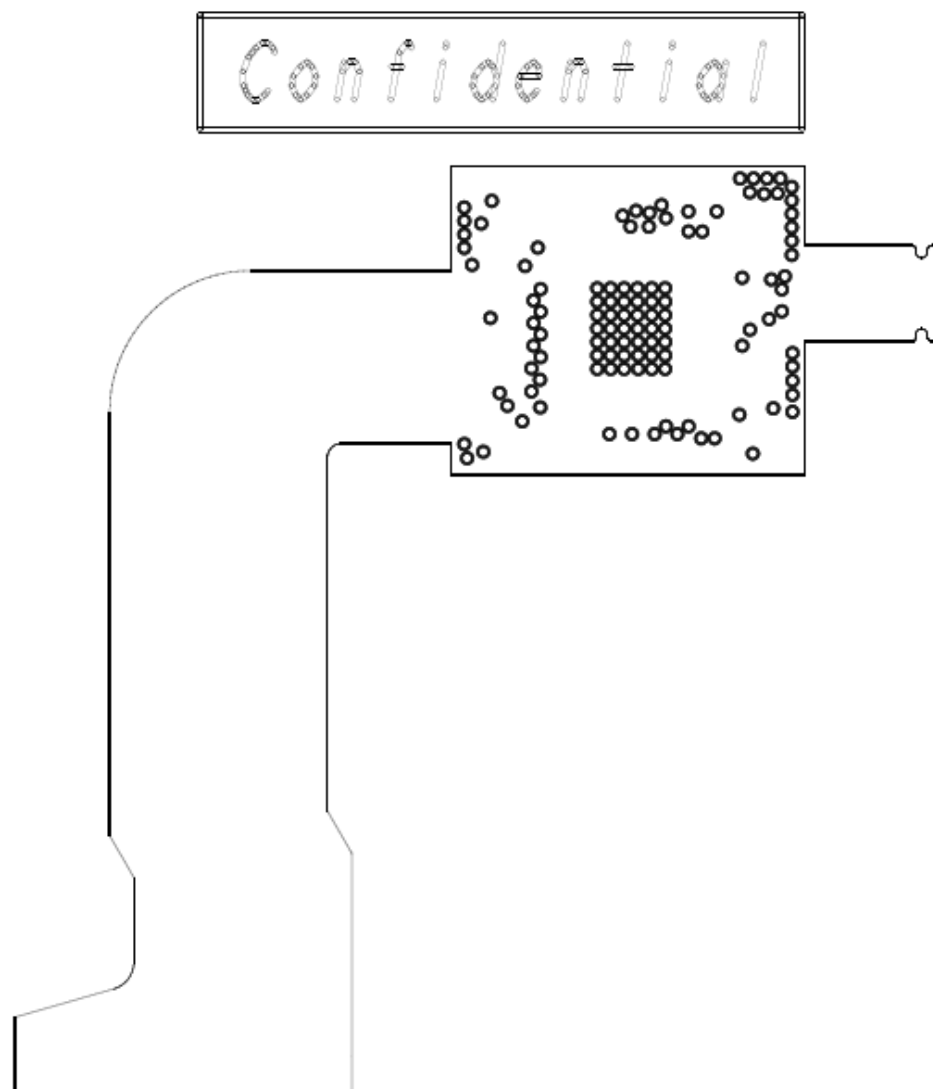
BLACK_SHIELD_2



MODEL	AMS397GE37 TSP	REV	0.8
LAYER	BLACK_SHIELD_2		
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

SAMSUNG Mobile Display CO., LTD.(All Rights Reserved).

Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	52/53
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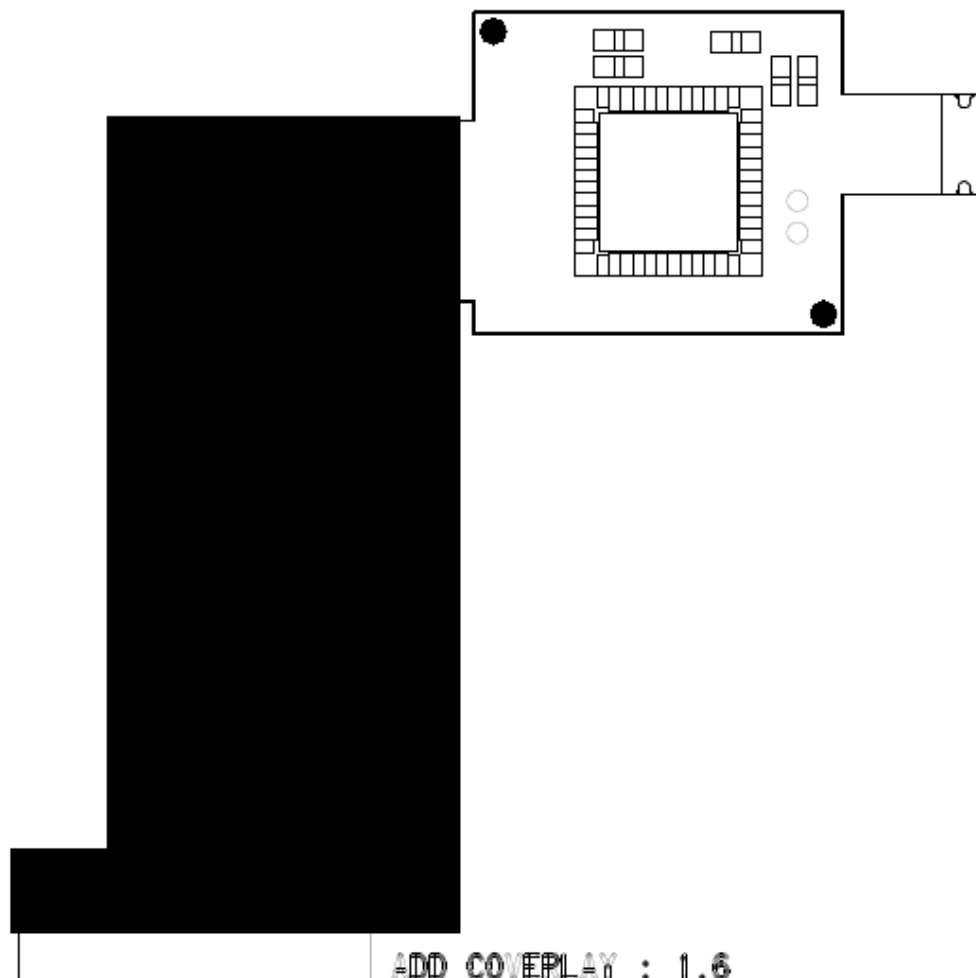


MODEL	AMS397GE37 TSP	REV	0.8
LAYER			
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

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Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	53/53
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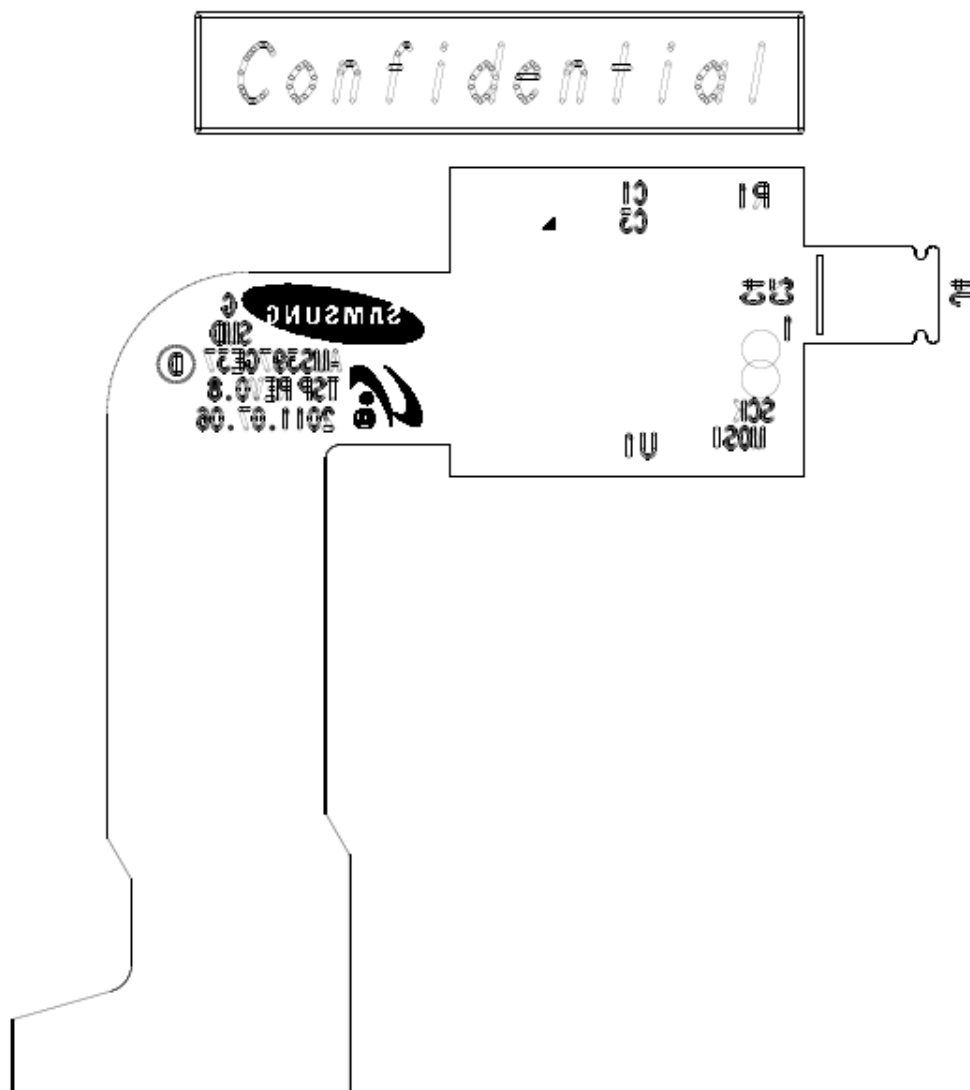
Confidential



MODEL	AMS397GE37 TSP	REV	0.8
LAYER	SOLDER_MASK_2		
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SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

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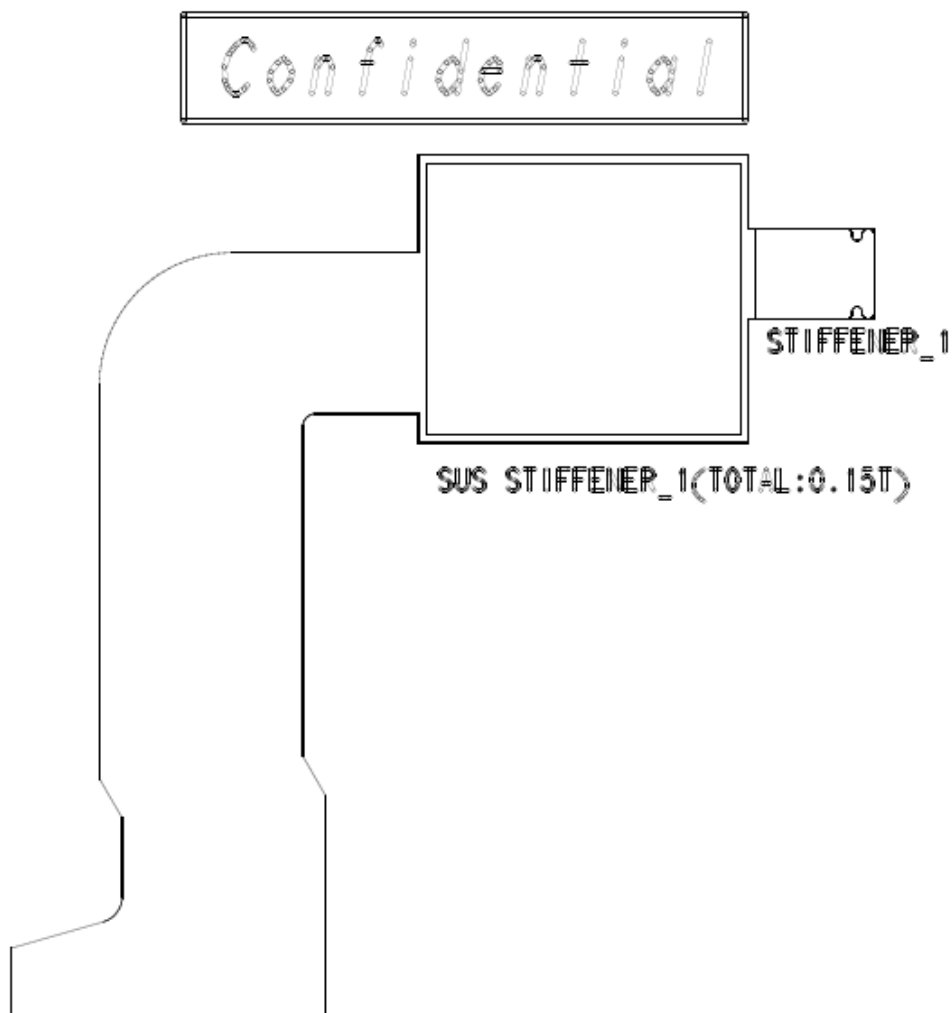
Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	54/53
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MODEL	AMS397GE37 TSP	REV	0.8
LAYER	SILKSCREEN_2		
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

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Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	55/53
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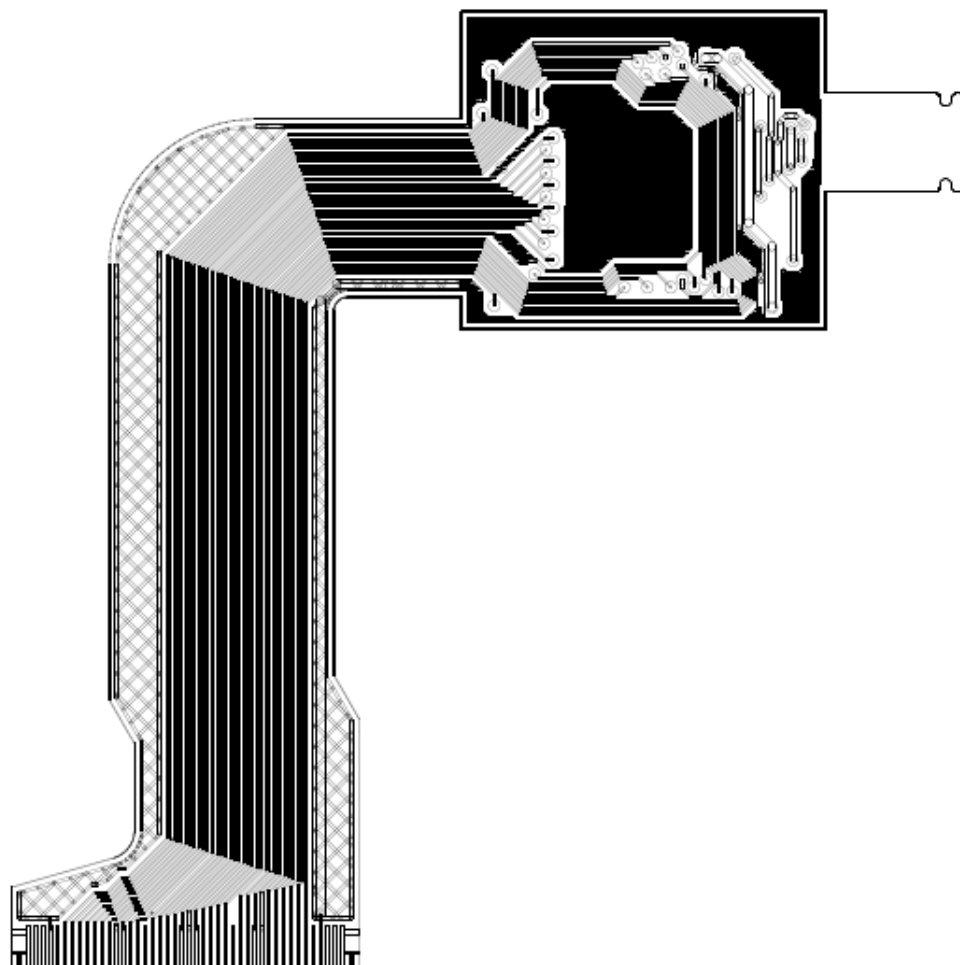


MODEL	AMS397GE37 TSP	REV	0.8
LAYER	STIFFENER_1		
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

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Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	56/53
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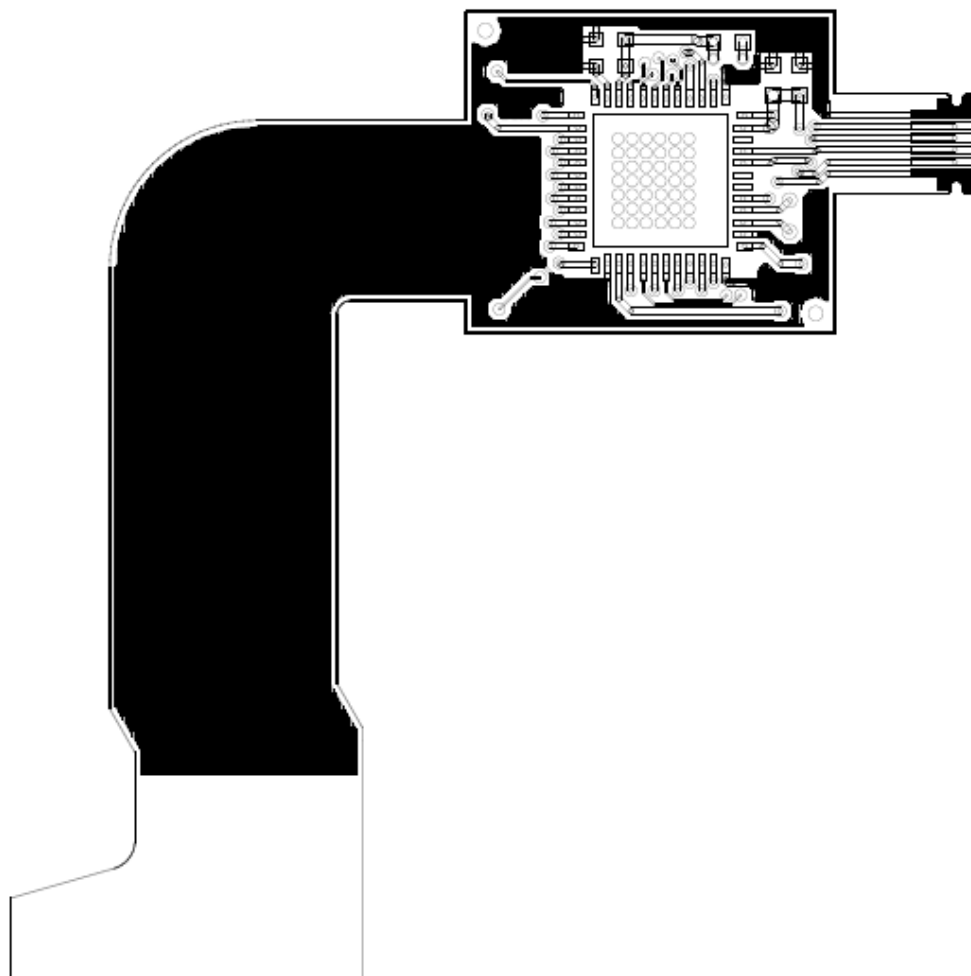


MODEL	AMS397GE37 TSP	REV	0.8
LAYER	COUP	(LAYER 1/2)	
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

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Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	57/53
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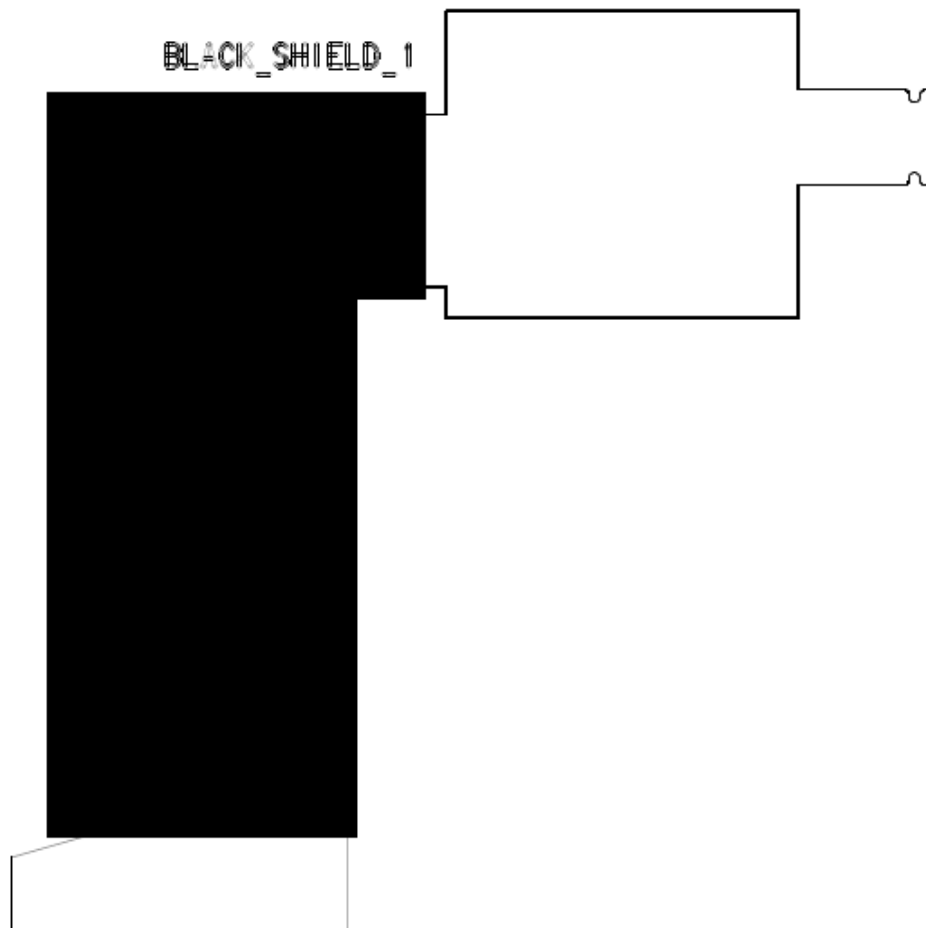
MODEL	AMS397GE37 TSP	REV	0.8
LAYER	SOLD	(LAYER 2/2)	
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY (All Rights Reserved)			

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Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	58/53
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Confidential

BLACK_SHIELD_1



MODEL	AMS397GE37 TSP	REV	0.8
LAYER	BLACK_SHIELD_1		
DATE	2011.07.06	DESIG'D	C.S.SON
SAMSUNG MOBILE DISPLAY(All Rights Reserved)			

SAMSUNG Mobile Display CO., LTD.(All Rights Reserved).

Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	59/53
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14-1-4. AMOLED Major Partlist

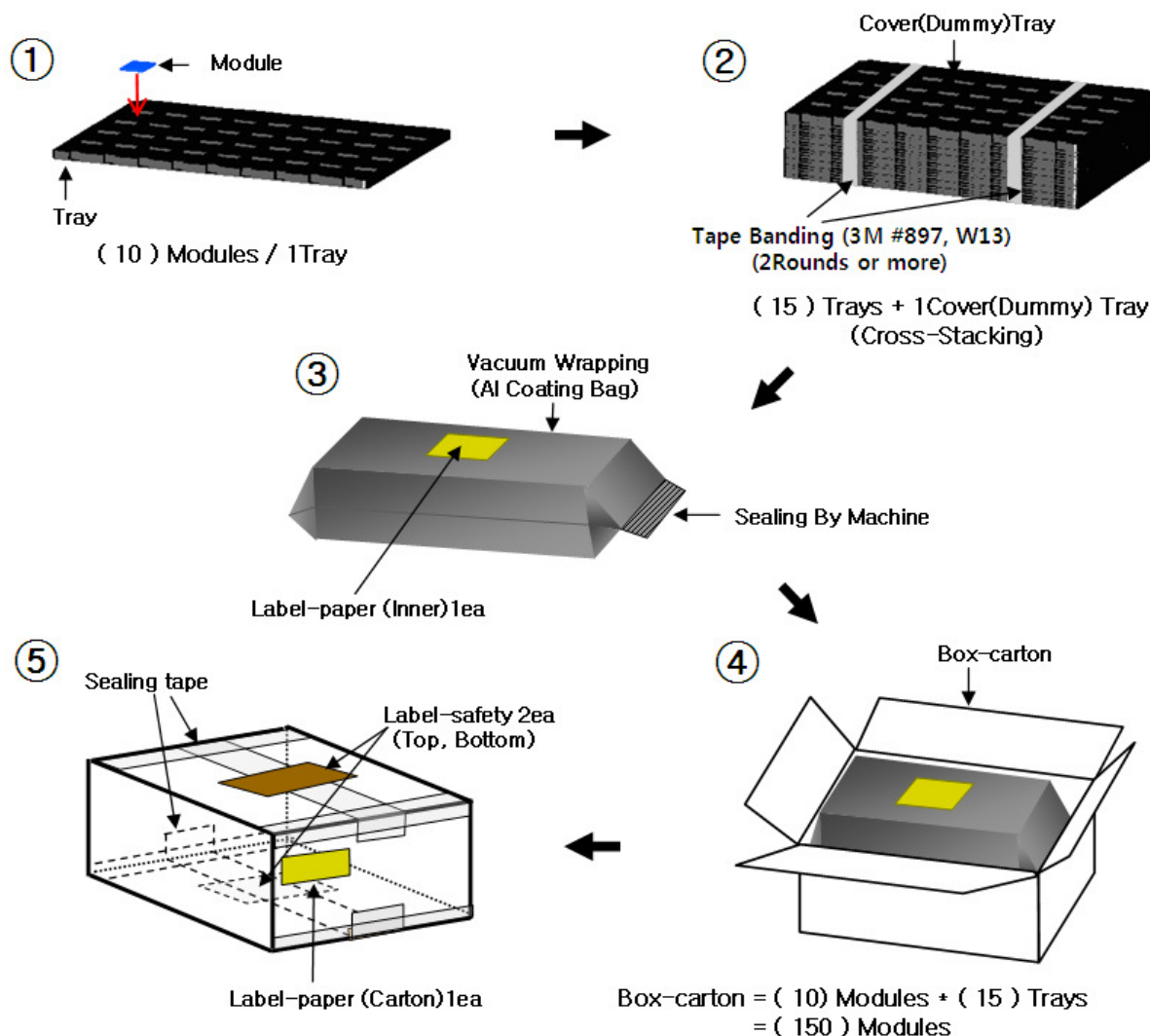
No	Name	Maker	Thickness
1	Encap Glass	SMD	0.5t
2	LTPS Glass	SMD	0.4t
3	Polarizer	Dongwoo Fine-Chem	0.15t
4	Window	Fuji Crystal	0.7t
5	Resin	Kyorit	0.25t
6	Black Tape	Samjoo	0.05t

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Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	60/53
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14-2. Packing Specification

- Box Pack



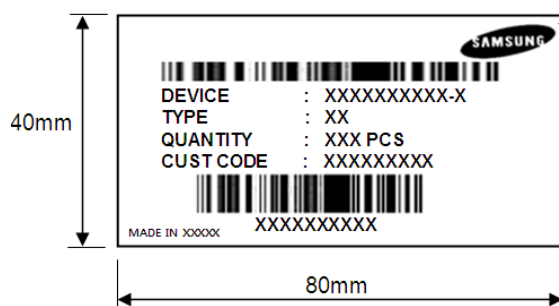
Note

- (1) Total :Box-carton approx. : (8.8)kg
- (2) Size :583(L) x 388(W) x 210(H)
- (3) Place the Module in the tray facing the active area direction.
- (4) Stack the trays and cover (dummy) tray.
- (5) Resistance of tray surface : $10^6 \sim 10^9 \Omega$
- (6) Wrap the Al coating bag by vacuum sealing machine and affix the Label-Paper on Bag.
- (7) Put the bag in the Box-carton .
- (8) Seal the Box-carton and affix the Label-safety & Label-paper.

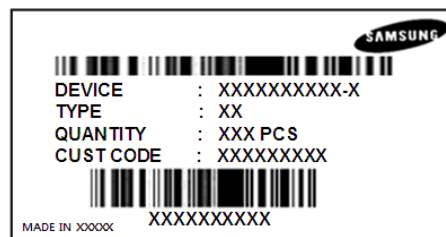
SAMSUNG Mobile Display CO., LTD.(All Rights Reserved).

- Label

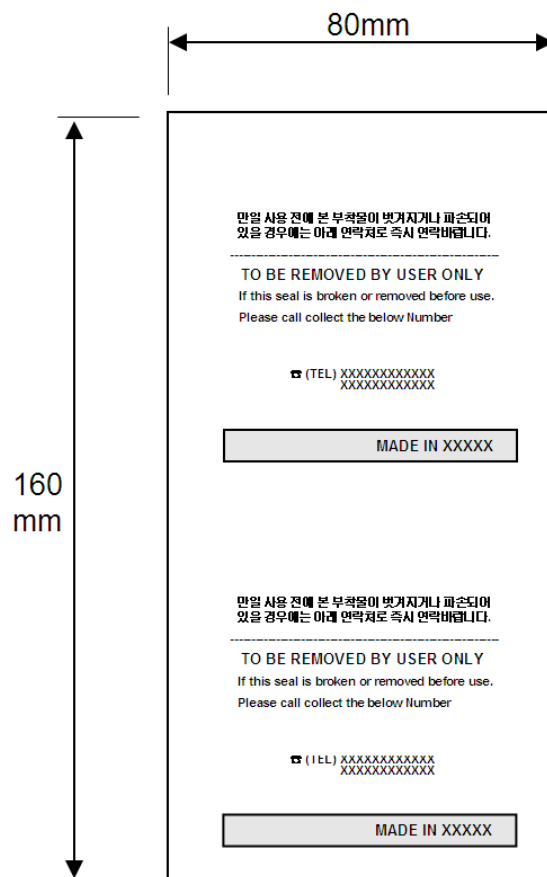
* Label-paper (Inner)



* Label-paper (Carton)



* Label-Safety



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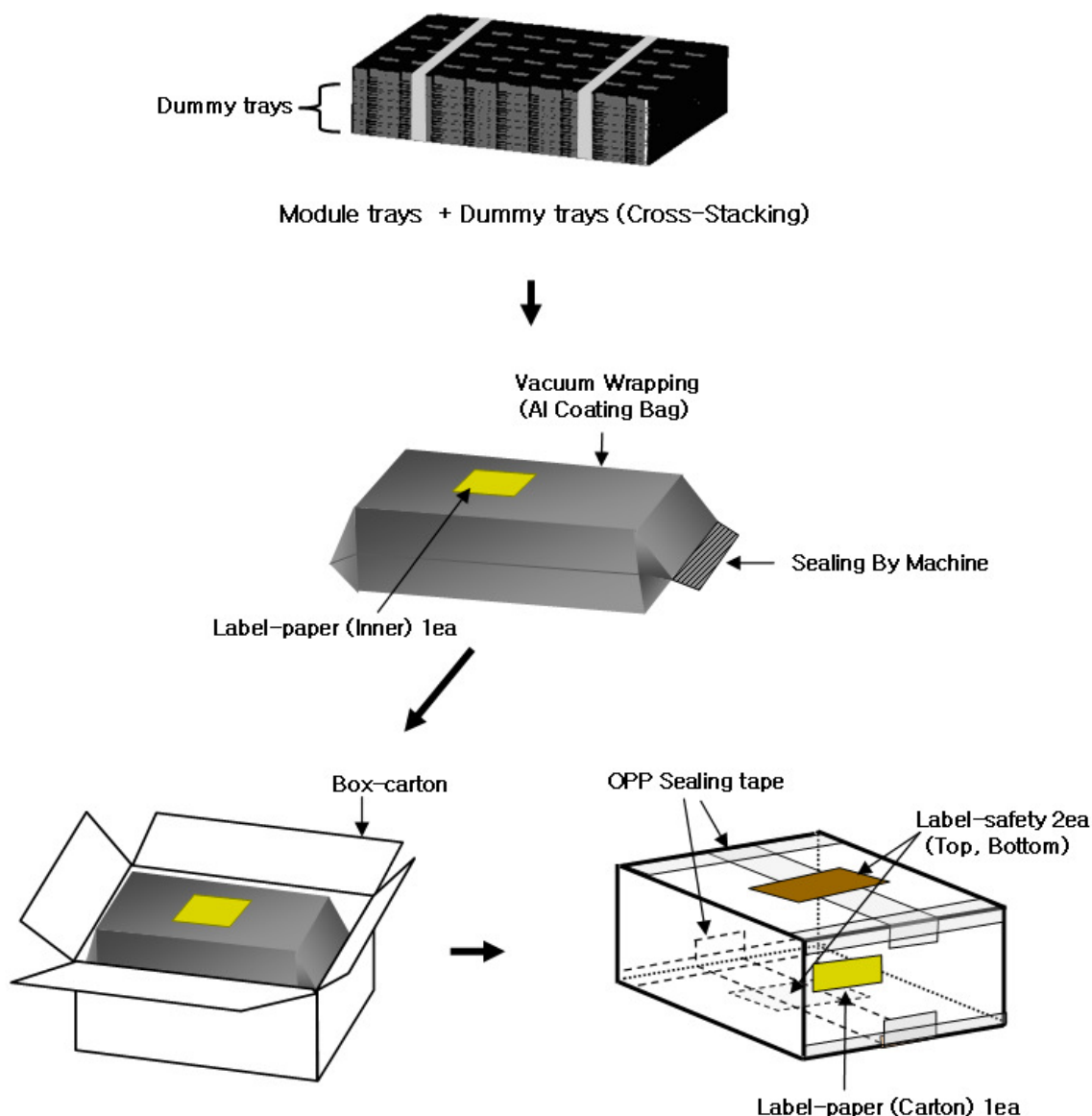
Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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- Packing for Small Quantities

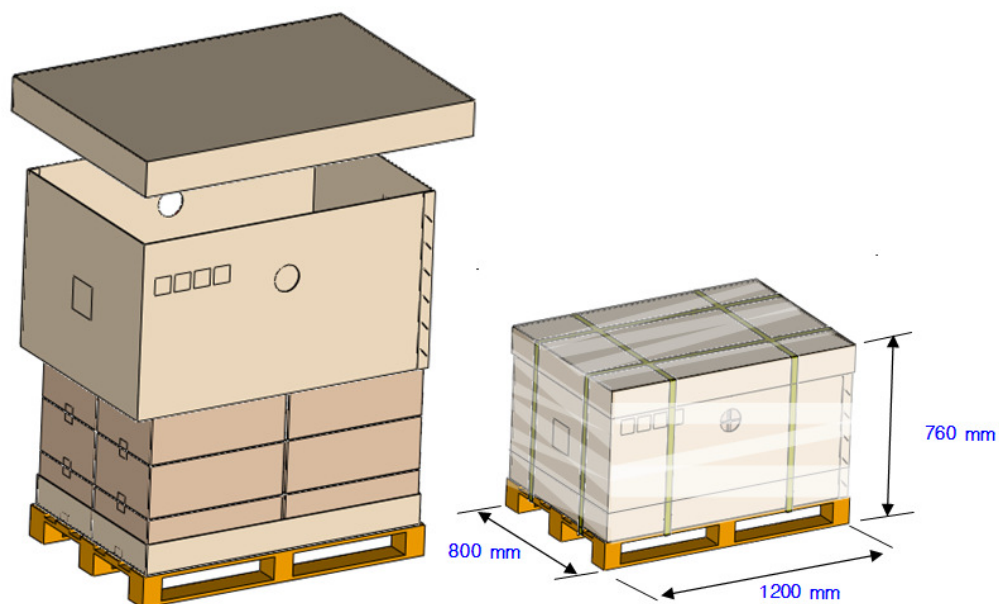


Note

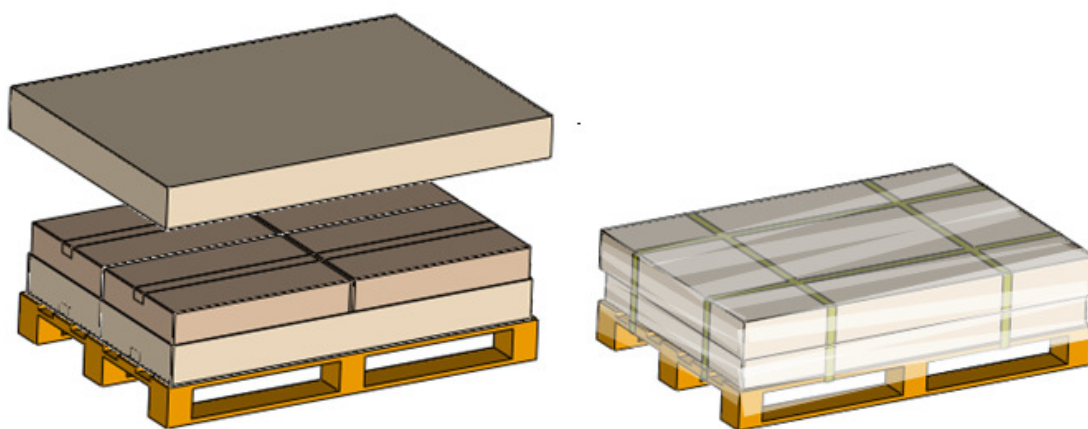
When package quantity is small, Modules containing trays are stacked the bottom, and dummy trays are stacked at the top of package, then wrap the Al coating bag by vacuum sealing machine and affix the Label-Paper on Bag. Put the Bag in the Box-carton Seal the Box-carton and affix the Label-safety & Label-Paper.

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- Over Pack



- Packing for Small Quantities



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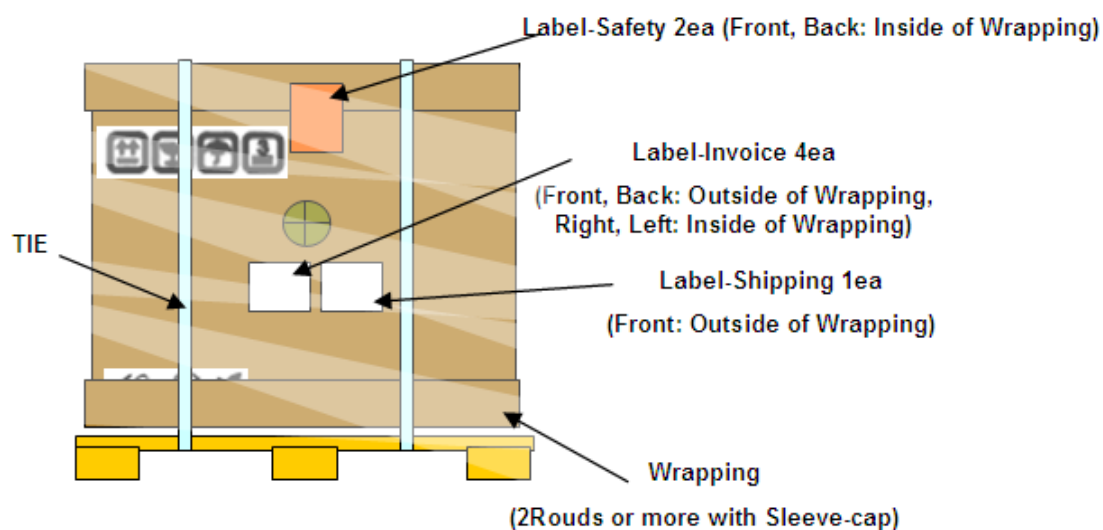
Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

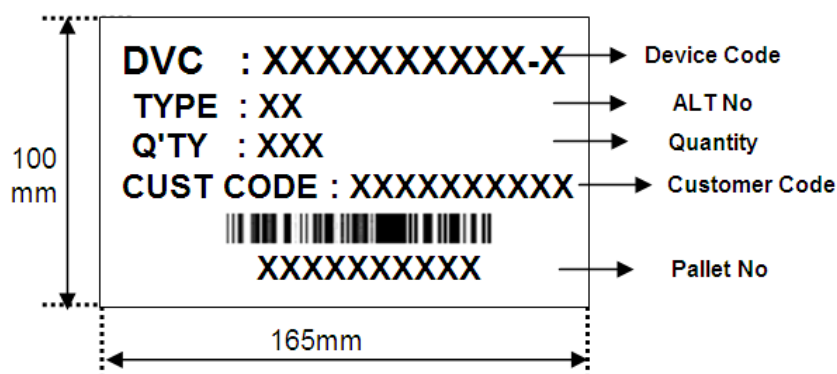
Rev. : 1.0

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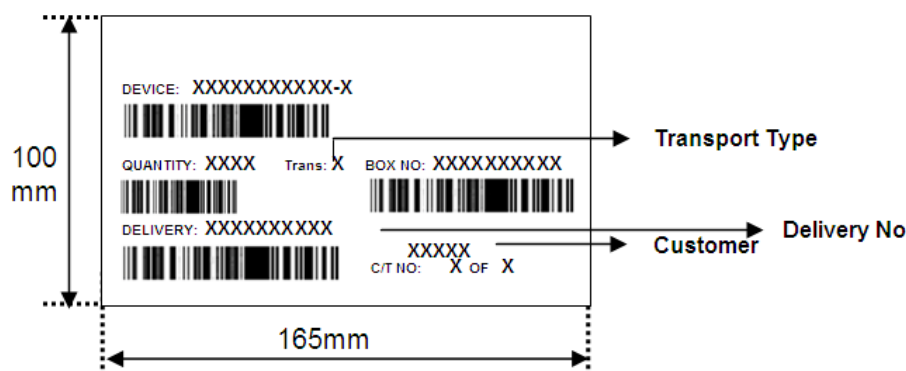
- Over Pack Attach



* Label-invoice



* Label-shipping



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*** Reference Image (Except Label and Wrap)**

<p>Carton Box</p>	
<p>Sleeve Box</p>	

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- Module Lot Marking



①
AMS397GE37-1 #####
DAYMMDD010
③

①	Model Code	AMS397GE37-1	
②	Module ID	#####	
③	Lot Marking	D	Module Assy' Site D : DSMD J : TSMD
		A	Assy' Shift
		YYMMDD	Date of Assy' ex)090525 : 2009.05.25
		01	Assy' Line
		O	SPL Level O : MP P : PCN E : ES W : WS

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Doc. No.: AMS397GE37

TITLE : 3.97" 480×800, 16M AMOLED

Rev. : 1.0

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15. Hazardous Materials Report

**CTK Co., Ltd.**

C-204, Bundang Technopark, 145, Yatap-dong, Bundang-gu,
Seongnam-si, Gyeonggi-do, Korea 463-760
Tel: +82-31-702-3155 Fax: +82-31-702-3158
www.e-ctk.com

Test Report

Applicant Name: SAMSUNG MOBILE DISPLAY
Address: 508, Sungsung-dong, Cheonan-si, Chungcheongnam-do,
Korea 330-300



Test Report No.: CTK1108-RS-0016
Date of Issue: Aug. 16, 2011

Sample Name: AMOLED MODULE (AMS397GE37)

Receipt Date: Aug. 10, 2011
Test Performing Date: Aug. 16, 2011

Test Performed: CTK Co., Ltd. tested the sample and item(s) which were selected
by applicant with following result

Test Results: Refer to following page.

Tested by Young Min Lee 
 Ho Jung Kim 

CTK Co., Ltd.



Sujin Cha / Lab. Manager

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 Date : Aug. 16, 2011

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Doc. No.: AMS397GE37	TITLE : 3.97" 480×800, 16M AMOLED	Rev. : 1.0	68/53
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1. PHOTO**AMOLED MODULE (AMS397GE37)**

< Front >



< Rear >



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2. TEST SAMPLE LIST

No.	SAMPLE NAME	Pages
1	PANEL ASS'Y	5~6
2	TOUCH PANEL ASS'Y	7~8
3	FPCB ASS'Y, TAPES, PROTECTION SHEET	9~10

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3. TEST RESULTS

1) PANEL ASS'Y

Heavy Metals				
Test Items	Unit	Test Results	MDL	Test Methods
Pb	mg/kg	N.D	5.0	IEC 62321_ ICP-OES
Cd		N.D	0.5	
Hg		N.D	1.0	
Cr ⁶⁺		N.D	0.2	IEC 62321_ UV/Vis Spectrometer

Halogen Contents					
Test Items		Unit	Test Results	MDL	Test Methods
PBB _s	Bromobiphenyl	mg/kg	N.D	20.0	IEC 62321_ GC/MS
	Dibromobiphenyl		N.D	20.0	
	Tribromobiphenyl		N.D	20.0	
	Tetrabromobiphenyl		N.D	20.0	
	Pentabromobiphenyl		N.D	20.0	
	Hexabromobiphenyl		N.D	20.0	
	Heptabromobiphenyl		N.D	20.0	
	Octabromobiphenyl		N.D	20.0	
	Nonabromobiphenyl		N.D	20.0	
	Decabromobiphenyl		N.D	50.0	
PBDE _s	Bromodiphenyl ether	mg/kg	N.D	20.0	IEC 62321_ GC/MS
	Dibromodiphenyl ether		N.D	20.0	
	Tribromodiphenyl ether		N.D	20.0	
	Tetrabromodiphenyl ether		N.D	20.0	
	Pentabromodiphenyl ether		N.D	20.0	
	Hexabromodiphenyl ether		N.D	20.0	
	Heptabromodiphenyl ether		N.D	20.0	
	Octabromodiphenyl ether		N.D	20.0	
	Nonabromodiphenyl ether		N.D	20.0	
	Decabromodiphenyl ether		N.D	50.0	

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- PANEL ASS'Y

Halogen Contents				
Test Items	Unit	Test Results	MDL	Test Methods
Fluorine (F)	mg/kg	N.A	-	-
Chlorine (Cl)		N.D	50.0	EN 14582_IC
Bromine (Br)		N.D	50.0	
Iodine (I)		N.A	-	-

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2) TOUCH PANEL ASS'Y

Heavy Metals					
Test Items	Unit	Test Results	MDL	Test Methods	
Pb	mg/kg	N.D	5.0	IEC 62321_ ICP-OES	
Cd		N.D	0.5		
Hg		N.D	1.0		
Cr ⁶⁺		N.D	0.2	IEC 62321_ UV/Vis Spectrometer	
Halogen Contents					
Test Items		Unit	Test Results	MDL	Test Methods
PBB _s	Bromobiphenyl	mg/kg	N.D	20.0	IEC 62321_ GC/MS
	Dibromobiphenyl		N.D	20.0	
	Tribromobiphenyl		N.D	20.0	
	Tetrabromobiphenyl		N.D	20.0	
	Pentabromobiphenyl		N.D	20.0	
	Hexabromobiphenyl		N.D	20.0	
	Heptabromobiphenyl		N.D	20.0	
	Octabromobiphenyl		N.D	20.0	
	Nonabromobiphenyl		N.D	20.0	
	Decabromobiphenyl		N.D	50.0	
PBDE _s	Bromodiphenyl ether	mg/kg	N.D	20.0	IEC 62321_ GC/MS
	Dibromodiphenyl ether		N.D	20.0	
	Tribromodiphenyl ether		N.D	20.0	
	Tetrabromodiphenyl ether		N.D	20.0	
	Pentabromodiphenyl ether		N.D	20.0	
	Hexabromodiphenyl ether		N.D	20.0	
	Heptabromodiphenyl ether		N.D	20.0	
	Octabromodiphenyl ether		N.D	20.0	
	Nonabromodiphenyl ether		N.D	20.0	
	Decabromodiphenyl ether		N.D	50.0	

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- TOUCH PANEL ASS'Y

Halogen Contents				
Test Items	Unit	Test Results	MDL	Test Methods
Fluorine (F)	mg/kg	N.A	-	-
Chlorine (Cl)		N.D	50.0	EN 14582_IC
Bromine (Br)		N.D	50.0	
Iodine (I)		N.A	-	-

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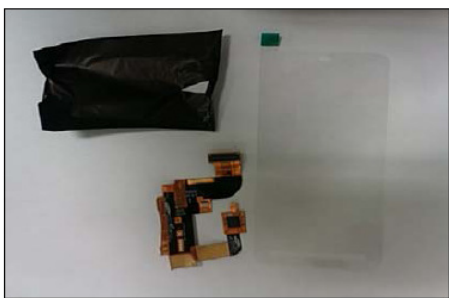
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3) FPCB ASS'Y, TAPES, PROTECTION SHEET

Heavy Metals					
Test Items	Unit	Test Results	MDL	Test Methods	
Pb	mg/kg	N.D	5.0	IEC 62321_ ICP-OES	
Cd		N.D	0.5		
Hg		N.D	1.0		
Cr ⁶⁺		N.D	0.2	IEC 62321_ UV/Vis Spectrometer	
Halogen Contents					
Test Items		Unit	Test Results	MDL	Test Methods
PBB _s	Bromobiphenyl	mg/kg	N.D	20.0	IEC 62321_ GC/MS
	Dibromobiphenyl		N.D	20.0	
	Tribromobiphenyl		N.D	20.0	
	Tetrabromobiphenyl		N.D	20.0	
	Pentabromobiphenyl		N.D	20.0	
	Hexabromobiphenyl		N.D	20.0	
	Heptabromobiphenyl		N.D	20.0	
	Octabromobiphenyl		N.D	20.0	
	Nonabromobiphenyl		N.D	20.0	
	Decabromobiphenyl		N.D	50.0	
PBDE _s	Bromodiphenyl ether	mg/kg	N.D	20.0	IEC 62321_ GC/MS
	Dibromodiphenyl ether		N.D	20.0	
	Tribromodiphenyl ether		N.D	20.0	
	Tetrabromodiphenyl ether		N.D	20.0	
	Pentabromodiphenyl ether		N.D	20.0	
	Hexabromodiphenyl ether		N.D	20.0	
	Heptabromodiphenyl ether		N.D	20.0	
	Octabromodiphenyl ether		N.D	20.0	
	Nonabromodiphenyl ether		N.D	20.0	
	Decabromodiphenyl ether		N.D	50.0	

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Rev. : 1.0

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- FPCB ASS'Y, TAPES, PROTECTION SHEET

Halogen Contents				
Test Items	Unit	Test Results	MDL	Test Methods
Fluorine (F)	mg/kg	N.A	-	-
Chlorine (Cl)		N.D	50.0	EN 14582_IC
Bromine (Br)		N.D	50.0	
Iodine (I)		N.A	-	-

*MDL : Method Detection Limit, N.D : Not Detected, N.A : Not applicable

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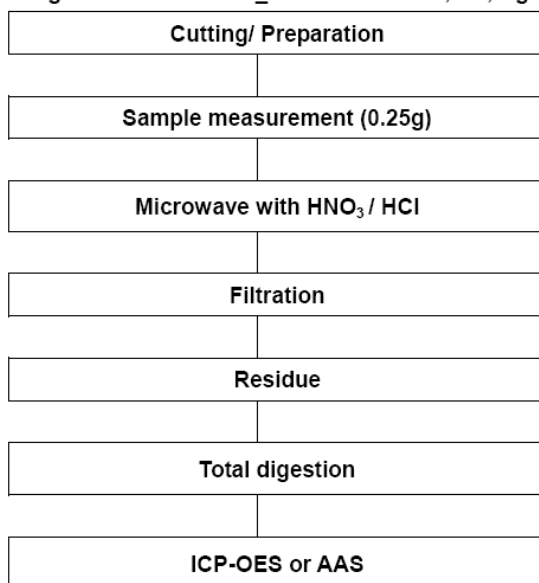
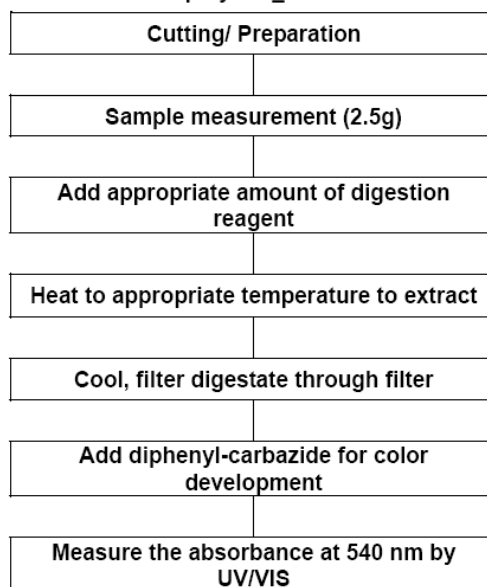
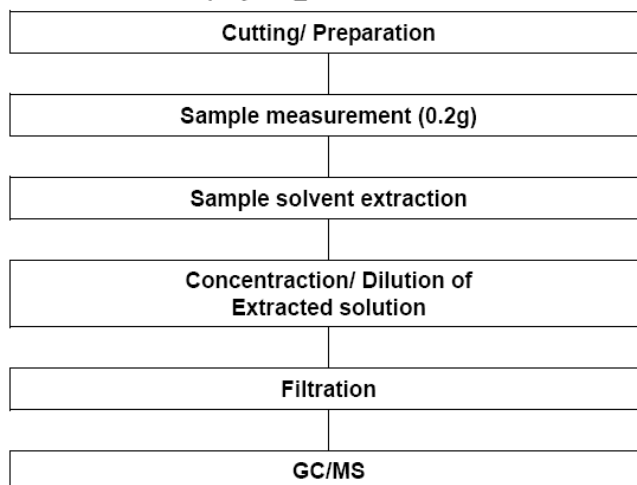
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4. FLOW CHART**Digestion for material_ IEC 62321 for Pb, Cd, Hg****Extraction for polymer_ IEC 62321 for Cr⁶⁺****Extraction for polymer_ IEC 62321 for PBBs, PBDEs**

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Oxygen bomb for halogen_EN 14582

Cutting/ Preparation
Sample measurement (1.0g)
Combustion (Oxygen bomb)
Cooling to room Temperature
Filtration
IC

*** End of Report ***

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Appendix

1. Command Set for Pentile

These parameters are the default value in driver IC, so it's not necessary to send a command.

Command	Parameter		Parameter	
B5h	1st	2Ch	17th	2Bh
	2nd	12h	18th	26h
	3rd	0Ch	19th	22h
	4th	0Ah	20th	20h
	5th	10h	21th	3Ah
	6th	0Eh	22th	34h
	7th	17h	23th	30h
	8th	13h	24th	2Ch
	9th	1Fh	25th	29h
	10th	1Ah	26th	26h
	11th	2Ah	27th	25h
	12th	24h	28th	23h
	13th	1Fh	29th	21h
	14th	1Bh	30th	20h
	15th	1Ah	31th	1Eh
	16th	17h	B2th	1Eh

Command	Parameter		Parameter	
B6h	1st	00h	9th	55h
	2nd	00h	10th	55h
	3rd	11h	11th	66h
	4th	22h	12th	66h
	5th	33h	13th	66h
	6th	44h	14th	66h
	7th	44h	15th	66h
	8th	44h	16th	66h

Command	Parameter		Parameter	
B7h	1st	2Ch	17th	2Bh
	2nd	12h	18th	26h
	3rd	0Ch	19th	22h
	4th	0Ah	20th	20h
	5th	10h	21th	3Ah
	6th	0Eh	22th	34h
	7th	17h	23th	30h
	8th	13h	24th	2Ch
	9th	1Fh	25th	29h
	10th	1Ah	26th	26h
	11th	2Ah	27th	25h
	12th	24h	28th	23h
	13th	1Fh	29th	21h
	14th	1Bh	30th	20h

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	15th	1Ah	31th	1Eh
	16th	17h	B2th	1Eh

Command	Parameter		Parameter	
B8h	1st	00h	9th	55h
	2nd	00h	10th	55h
	3rd	11h	11th	66h
	4th	22h	12th	66h
	5th	33h	13th	66h
	6th	44h	14th	66h
	7th	44h	15th	66h
	8th	44h	16th	66h

Command	Parameter		Parameter	
B9h	1st	2Ch	17th	2Bh
	2nd	12h	18th	26h
	3rd	0Ch	19th	22h
	4th	0Ah	20th	20h
	5th	10h	21th	3Ah
	6th	0Eh	22th	34h
	7th	17h	23th	30h
	8th	13h	24th	2Ch
	9th	1Fh	25th	29h
	10th	1Ah	26th	26h
	11th	2Ah	27th	25h
	12th	24h	28th	23h
	13th	1Fh	29th	21h
	14th	1Bh	30th	20h
	15th	1Ah	31th	1Eh
	16th	17h	B2th	1Eh

Command	Parameter		Parameter	
BAh	1st	00h	9th	55h
	2nd	00h	10th	55h
	3rd	11h	11th	66h
	4th	22h	12th	66h
	5th	33h	13th	66h
	6th	44h	14th	66h
	7th	44h	15th	66h
	8th	44h	16th	66h

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