CUSTOMER APPROVAL SHEET

Company Name	**PITEK**
MODEL	**PA7201280#V4**
CUSTOMER APPROVED	**Title :** **Name :**

Doc. version :	1.7
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Date :	2015/06/04

Product Specification

5.0" Color AMOLED w/t On-Cell Touch Module

MODEL NAME: PA7201280#V4

Record of Revision

Version	Revise Date	Page	Content
0.0	Aug. 23, 2013		First Draft
0.1	Aug. 28, 2013		Add EE setting
0.2	Oct. 16, 2013		Spec. modified.
0.3	Nov. 6, 2013	15,16,18,21	Change Power on sequence and Power off sequence.
0.4	Nov. 28, 2013	18 ~ 21	Change Initial code.
0.5	Dec. 13, 2013	18 ~ 21 29~30,	Add VESA standard / Change power consumption & initial code/ Module drawing
0.6	Jan. 08, 2014	6	Revised pin 27 MIPI DSI data3+, pin 28 MIPI DSI data3-
0.7	Apr, 02, 2014	21	Add description on Display Timing
0.8	Nov. 06, 2014	4	Add VIDEO mode on Driver IC remark
0.8	Nov. 06, 2014	28	Add Precaution
0.9	Dec. 30, 2014	8	Update white pattern current & max current
1.0	Jan. 09, 2015	4	Touch IC supports wakeup gesture (double click and swipe)
		22	Revised optical Spec: color temperature
		27	Revised reliability test condition
1.1	Jan. 14, 2015	5~7	Add TP Spec
1.2	Jan. 23, 2015	5	Add TP discription.
		20	Modified initial code
		34~35	Glass thickness tolerance
1.3	Mar.09, 2015		Modified format, add uniformity Spec.
1.4	Mar.12, 2015	20	Added color temperature.
1.5	Mar.19, 2015	5	Modified connector model name
1.6	May. 08, 2015	27, 28	Added Main FPC silver ink, alignment mark, and EMI tape.
1.7	May. 19, 2015	4	Added description of NC
		20	Modifed viewing angle CR, cross talk description
	May. 28, 2015	6	Modified Pin assignment: OVDD Detect
	May.29. 2015	15	Added more discription of power-on sequence
	Jun. 4, 2015	27~28	Added FPC mark.

Contents

A. General Specification

1. AMOELD Panel Physical Specifications

No.	Item	Spec.	Remark
1	Screen Size (inch)	4.97”	
2	Display Resolution (dot)	720xRGBx1280	
3	Active Area (mm)	61.92 (H)×110.08(V)	
4	Pixel Configuration	Real R.G.B	
5	Display Color	16.7M	
6	Interface	MIPI DSI	VIDEO mode
7	Outline Dimension (mm)	65.92 (H) × 118.64(V) × 1.00(T)	AMOLED w/ on-cell touch function
8	Touch IC	S3402	Synaptics
9	Multi-Finger Touch	10	

2. FPC Pin Assignment

Recommended connector: 39pins ZIF connector P/N: FF20-39A-R11A-B-3H

#	Pin_name	I/O	Description
1	GND	Power	Ground
2	NC		No connection
3	TP_RESX	I	Touch panel reset
4	TP_SCL	I/O	Touch panel I2C clock
5	TP_SDA	I/O	Touch panel I2C data
6	TP_INT	I/O	Touch panel interrupt output
7	TP_VDDI	Power	Touch panel digital supply
8	TP_VCC	Power	Touch panel analog supply
9	NC		No connection
10	VCI	Power	Driver IC analog supply
11	GND	Power	Ground
12	D3N	I	MIPI DSI data3-
13	D3P	I	MIPI DSI data3+
14	GND	Power	Ground
15	D0N	I/O	MIPI DSI data0-
16	D0P	I/O	MIPI DSI data0+
17	GND	Power	Ground
18	CKN	I	MIPI DSI clock-
19	CKP	I	MIPI DSI clock+
20	GND	Power	Ground
21	D1N	I	MIPI DSI data0-
22	D1P	I	MIPI DSI data0+
23	GND	Power	Ground
24	D2N	I	MIPI DSI data2-
25	D2P	I	MIPI DSI data2+

26	GND	Power	Ground
27	VDDI	Power	Driver IC digital supply
28	RESX	I	This signal will reset the device and must be applied to properly initialize the chip. Signal is active low.
29	TE	O	Sync signal from driver IC
30	OTP_PWR	Power	Driver IC R/W use only，system side must floating
31	NC		No connection
32	OVDD Detect	Power	OLED voltage detect pin，please floating if no use
33	NC		No connection
34	VBAT	Power	panel power supply
35	VBAT	Power	panel power supply
36	VBAT	Power	panel power supply
37	VBAT	Power	panel power supply
38	VBAT	Power	panel power supply
39	GND	Power	Ground

Note. I:Input pin; O: Output pin; P:Power pin; NC: No connection n; I/O: In-out pin

3. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Power IC Power supply	VBAT	-	+4.5	V
Digital Power supply	VDDI	-0.3	+2.0	V
Analog Power supply	VCI	-0.3	+4.0	V
Touch analog power supply	TP_VCC	-0.3	+4.0	V
Touch digital power supply	TP_VDDI	-0.3	+2.0	V

Note : If the module exceeds the absolute maximum ratings, it may be damaged permanently.

B. DC Characteristics

1. Operation Conditions

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Panel Power supply		VBAT	2.9	3.7	4.5	V	
Digital Power supply		VDDI	1.65	1.8	1.95	V	
Analog Power supply		VCI	2.7	3.1	3.6	V	
Input Signal Voltage	H Level	V_{IH}	0.8*VDDI	-	VDDI	V	RESX
	L Level	V_{IL}	0	-	0.2*VDDI	V	
Output Signal Voltage	H Level	V_{OH}	0.7*VDDI	-	VDDI	V	TE
	L Level	V_{OL}	0	-	0.3*VDDI	V	
Touch analog power supply		TP_VCC	2.7	3.1	3.6	V	
Touch digital power supply		TP_VDDI	1.65	1.8	1.95	V	

Note 1: The operation is guaranteed under the recommended operating conditions only. The operation is not guaranteed if a quick voltage change occurs during the operation. To prevent the noise, a bypass capacitor must be inserted into the line closed to the power pin.

2. Display Current Consumption

Mode	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Normal	I_{BAT}	VBAT = 3.7V VCI = 3.1V VDDI = 1.8V	-	300	360	mA	Note1
	I_{VCI}		-	60	80	mA	Note2
	I_{VDDI}		-	1	10	mA	Note2
Deep Standby (DSTB=1)	$I_{OVDD/OVSS}$		-	-	<1	mA	Note3
	I_{VCI}		-	-	<1	mA	Note3
	I_{VDDI}		-	-	<1	μA	Note3

Note 1: VBAT input 2.9V, I_{BAT} maximum current enhance to 460mA.
Note 2: Based on white pattern. MIPI-DSI frame rate 60Hz video mode.
Note 3: Display off. RESX = high

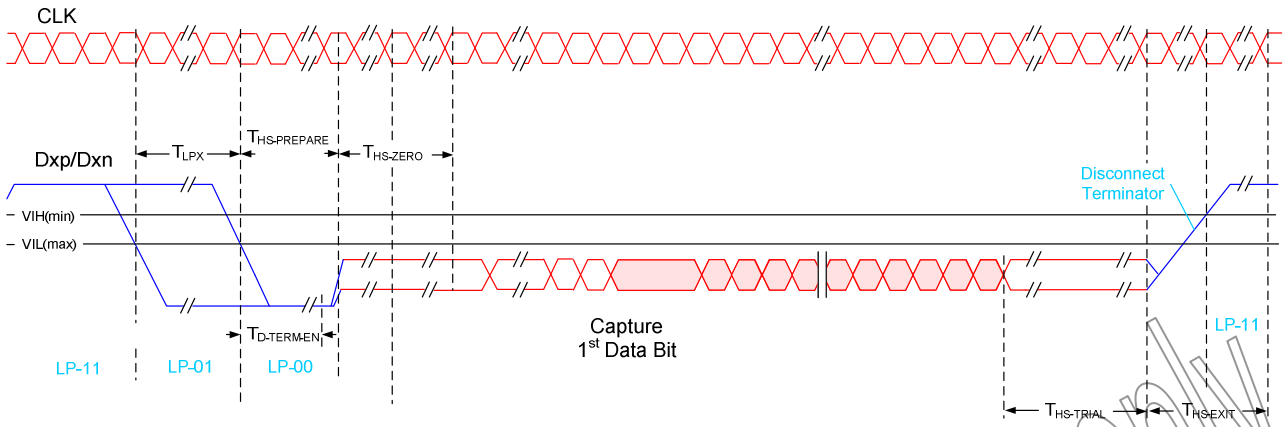
3. Touch Panel Current Consumption

Mode	Symbol	Condition	min	Typ.	Max	Unit
Active (1 finger)	I_{TP_VDDI}	TP_VDDI = 1.8V TP_VCC=3.1V Report Rate: 100Hz Doze Interval: 30 ms (26Rx x 15Tx)	-	13	14.3	mA
	I_{TP_VCC}		-	12.5	13.75	mA
Active (10 finger)	I_{TP_VDDI}		-	18.5	20.35	mA
	I_{TP_VCC}		-	12.5	13.75	mA
Normal Operation	I_{TP_VDDI}		-	0.4	0.44	mA
	I_{TP_VCC}		-	0.35	0.39	mA
Sensor Sleep (Deep sleep)	I_{TP_VDDI}		-	13.3	14.6	µA
	I_{TP_VCC}		-	8	8.8	µA

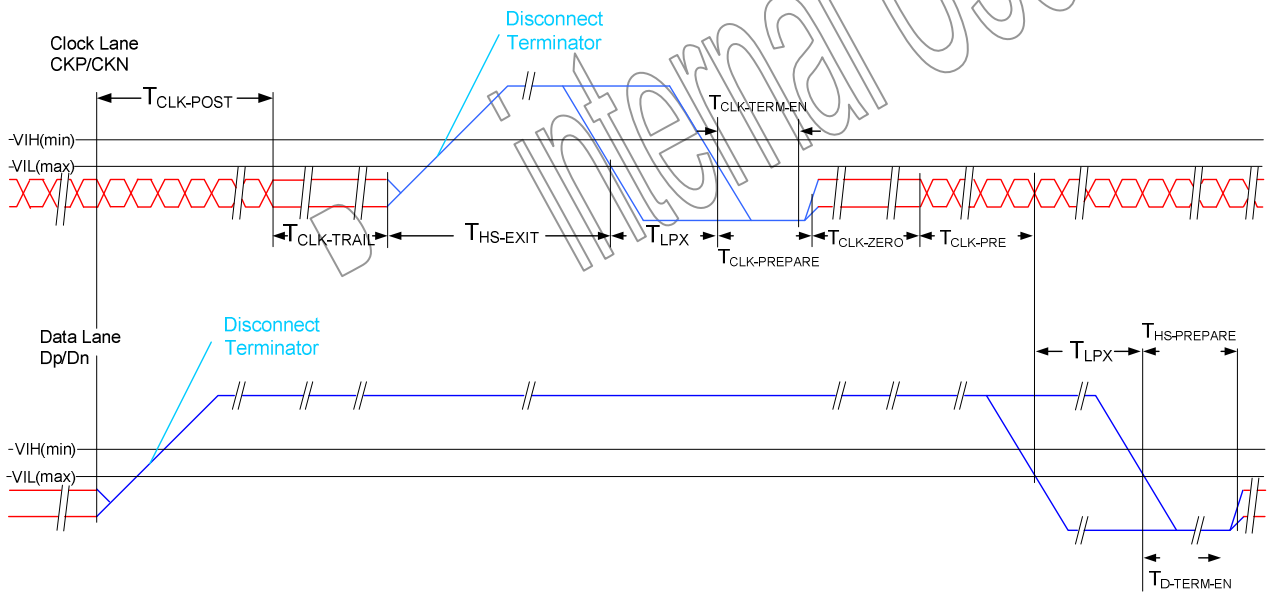
C. AC Characteristics

1. Display AC Characteristics

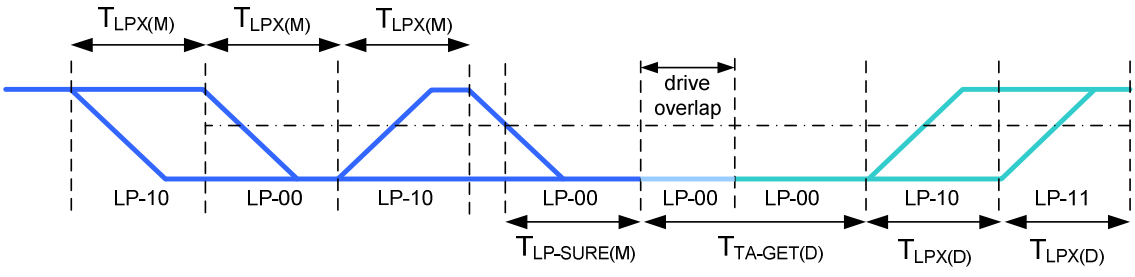
HS Data Transmission Burst



HS clock transmission



Turnaround Procedure



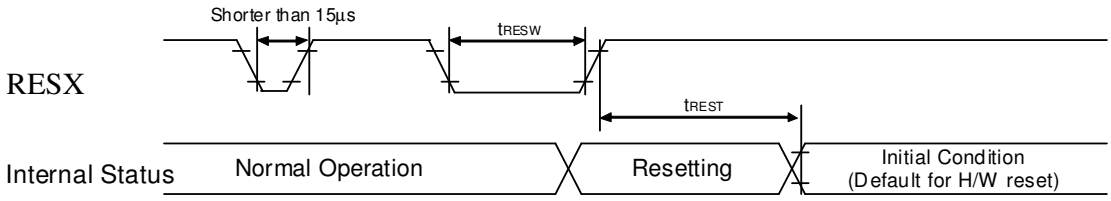
Timing Parameters

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

$T_{HS-PREPARE}$ + $T_{HS-ZERO}$	$T_{HS-PREPARE}$ + time that the transmitter drives the HS-0 state prior to transmitting the Sync sequence.	145ns + 10*UI			ns
$T_{HS-TRAIL}$	Time that the transmitter drives the flipped differential state after last payload data bit of a HS transmission burst	60ns + 4*UI			ns
$T_{LPX(M)}$	Transmitted length of any Low-Power state period of MCU to display module	50		150	ns
$T_{TA-SURE(M)}$	Time that the display module waits after the LP-10 state before transmitting the Bridge state (LP-00) during a Link Turnaround.	$T_{LPX(M)}$		$2*T_{LPX(M)}$	ns
$T_{LPX(D)}$	Transmitted length of any Low-Power state period of display module to MCU	50		150	ns
$T_{TA-GET(D)}$	Time that the display module drives the Bridge state (LP-00) after accepting control during a Link Turnaround.	$5*T_{LPX(D)}$			ns
$T_{TA-GO(D)}$	Time that the display module drives the Bridge state (LP-00) before releasing control during a Link Turnaround.	$4*T_{LPX(D)}$			ns
$T_{TA-SURE(D)}$	Time that the MPU waits after the LP-10 state before transmitting the Bridge state (LP-00) during a Link Turnaround.	$T_{LPX(D)}$		$2*T_{LPX(D)}$	ns

2. Display RESET Timing Characteristics

Reset input timing



Timing Parameters

Symbol	Parameter	Related Pins	MIN	TYP	MAX	Note	Unit
t_{RESW}	*1) Reset low pulse width	RESX	15	-	-	-	µs
t_{REST}	*2) Reset complete time	-	-	-	5	When reset applied during Sleep in mode	ms
		-		-	120	When reset applied during Sleep out mode	ms

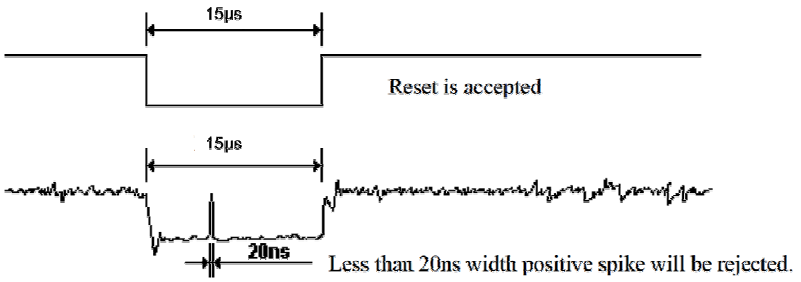
Note 1. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5µs	Invalid Reset
Longer than 15µs	Valid Reset
Between 5µs and 15µs	Reset Initialization Precedure

Note 2. During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then return to Default condition for H/W reset.

Note 3. During Reset Complete Time, data in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (tREST) within 5ms after a rising edge of RESX.

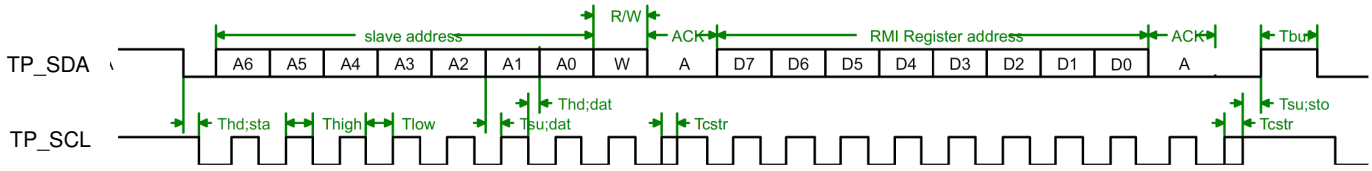
Note 4. Spike Rejection also applies during a valid reset pulse as shown below:



Note 5. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

3. Touch Panel Timing Characteristics

I2C timing

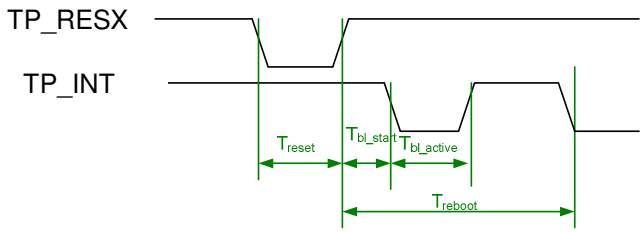


Timing Parameters

Symbol	Parameter	Standard- Mode Host		Fast-Mode Host		Unit
		Min.	Max.	Min.	Max.	
fSCL	SCL clock frequency	-	100	-	400	kHz
Tcstr	Stretch time	-	25	-	25	µs
Thd;sta	Hold time (repeated) START condition. After this period, the first clock pulse is generated.	4.0	-	0.6	-	µs
Tlow	LOW period of the SCL clock	4.7	-	1.3	-	µs
Thigh	HIGH period of the SCL clock	4.0	-	0.6	-	µs
Tsu;sta	Set-up time for a repeated START condition	4.7	-	0.6	-	µs
Thd;dat	Data hold time	0	3.45	0	0.9	µs
Thd;dato	Data out hold time	-	0	-	0	µs
Tsu;dat	Data set-up time	250	-	100	-	ns
Tr	Rise time of both SDA and SCL signals	-	1000	20 + 0.1 Cb	300	ns
Tf	Fall time of both SDA and SCL signals	-	3000	20 + 0.1 Cb	300	ns
Tsu;sto	Set-up time for STOP condition	4.0	-	0.6	-	µs
Tbuf	Bus free time between a STOP and START condition	4.7	-	1.3	-	µs
Cb	Capacitive load for each bus line	-	400	-	400	pF
VnL	Noise margin at the LOW level for each connected device (including hysteresis)	0.1 TP_VDDI		0.1 TP_VDDI		V
VnH	Noise margin at the HIGH level for each connected device (including hysteresis)	0.2 TP_VDDI	-	0.2 TP_VDDI	-	V

Touch Panel RESET Timing Characteristics

Reset input timing

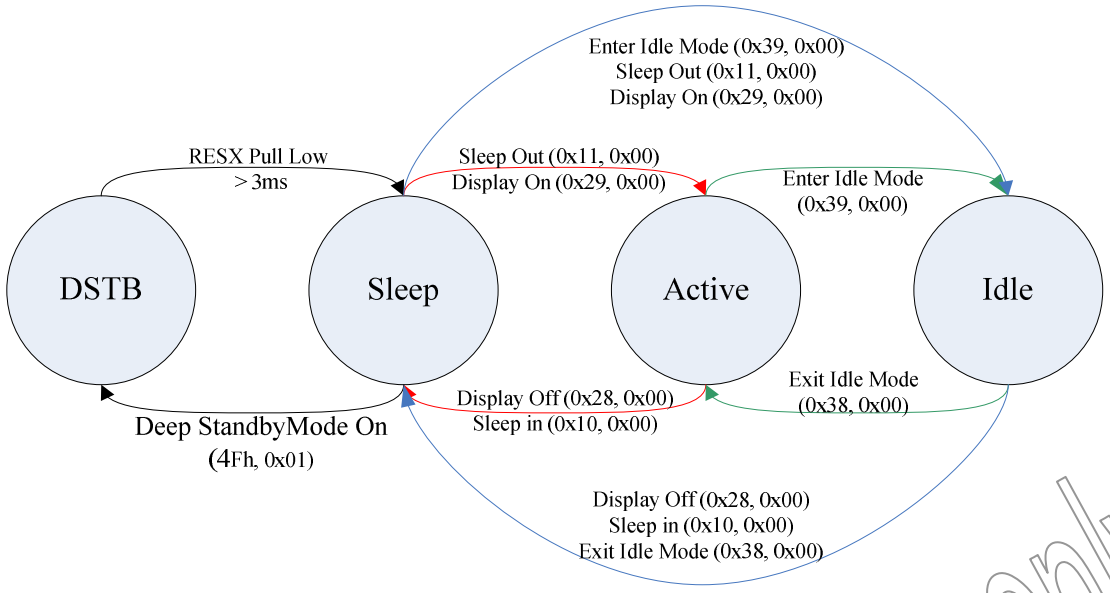


Timing Parameters

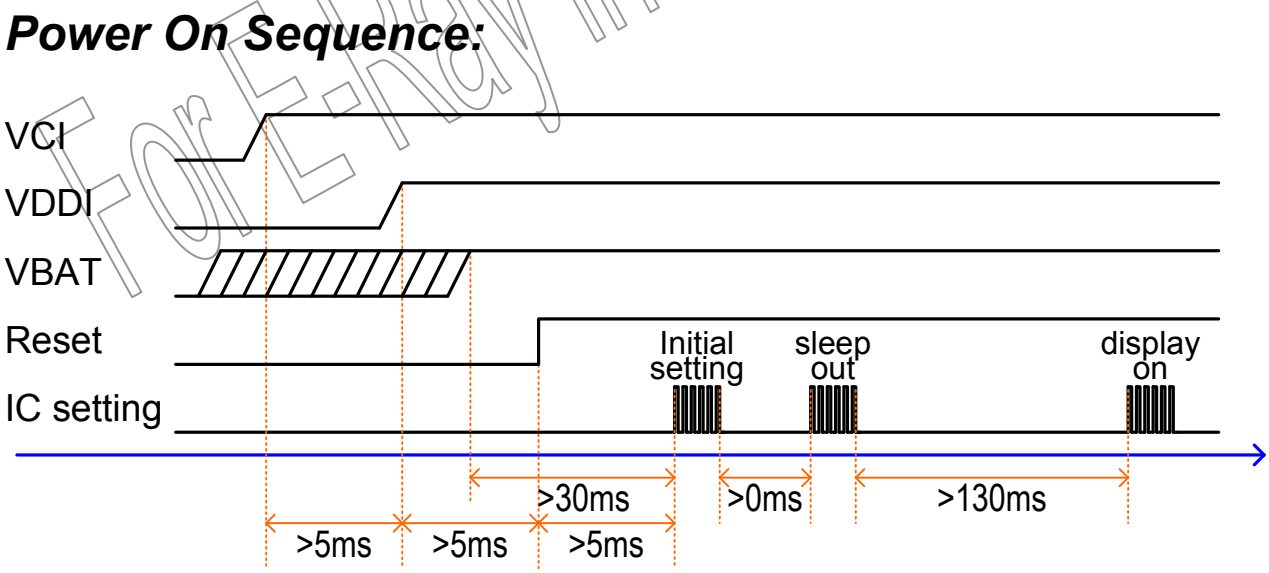
Symbol	Min.	Max.	Unit
T_{reset} (TP_RESX)	100	-	ns
T_{bl_start}	-	2	ms
T_{bl_active}	-	11	ms
T_{reboot}	-	16	ms

4. Operating Sequence

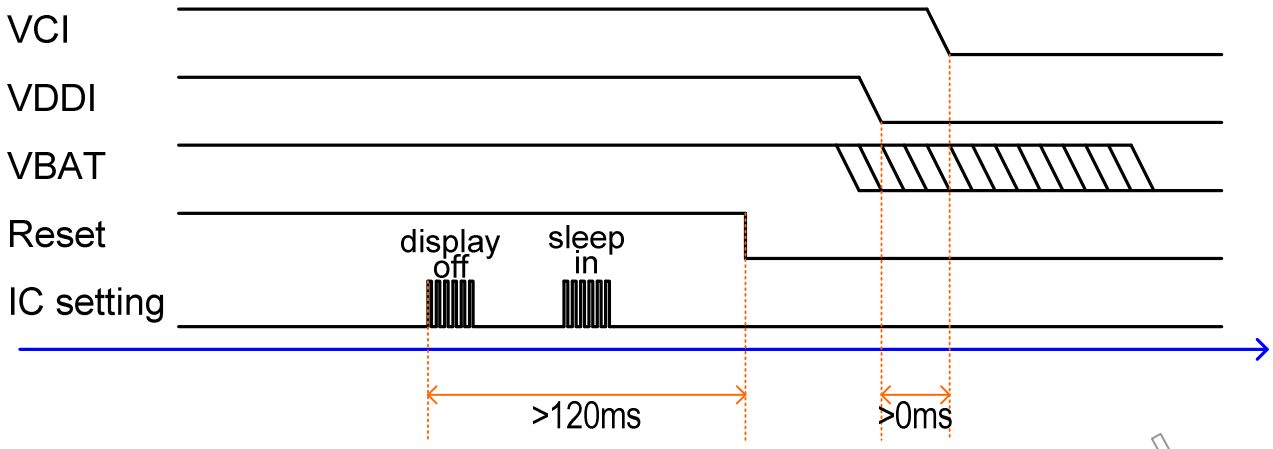
State Diagram



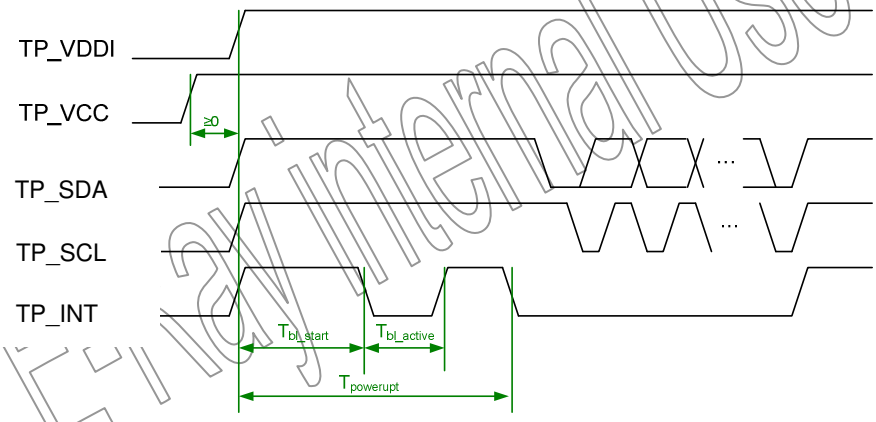
Display Power on / off Sequence



Power Off Sequence:



Touch Panel Power on Sequence

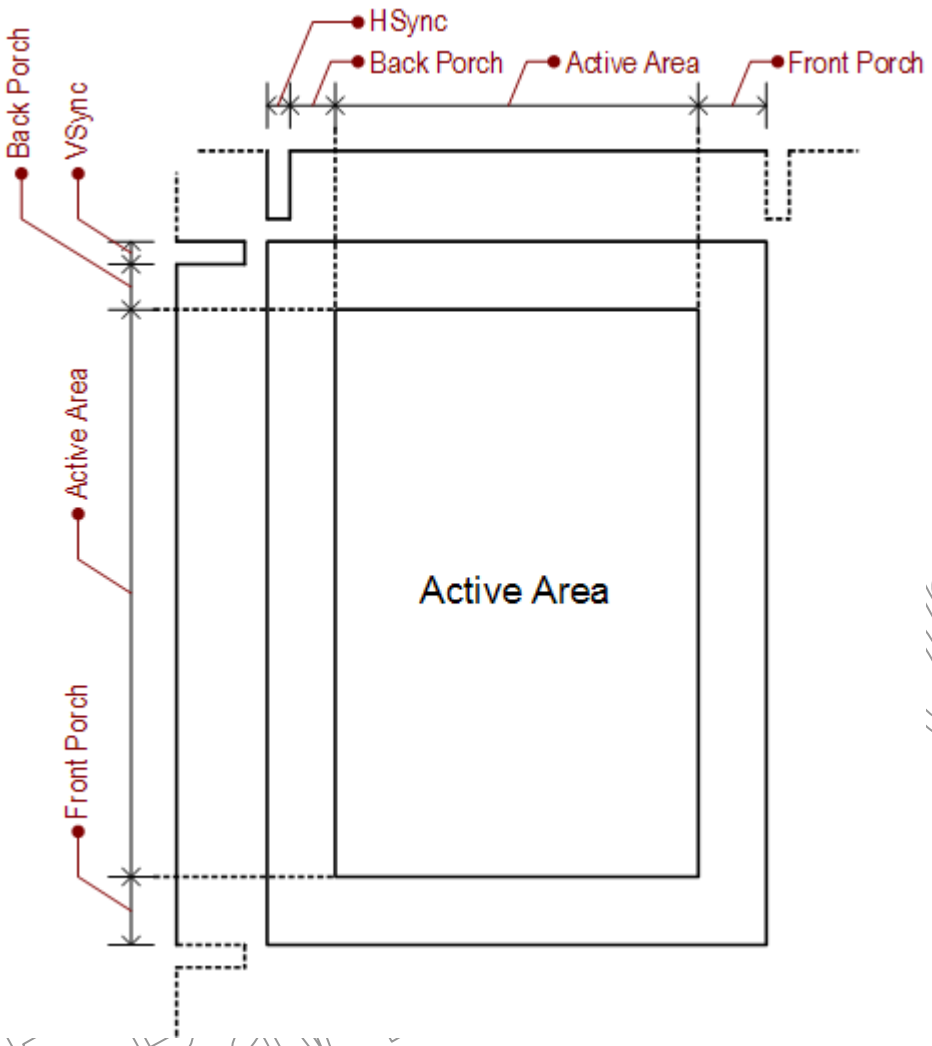


Symbol	Min.	Max.	Unit
$T_{powerupt}$	-	60	ms
T_{bl_start} (bootloader start)	-	46	ms
T_{bl_active} (bootloader active)	-	11	ms

Display Initial Setting

Item	Parameter qt'y	address	P0	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	5	F0	55	AA	52	08	00						
2	3	B0	00	10	10								
3	1	BA	60										
4	7	BB	00	00	00	00	00	00	00				
5	8	C0	C0	04	00	20	02	E4	E1	C0			
6	8	C1	C0	04	00	20	04	E4	E1	C0			
7	5	F0	55	AA	52	08	02						
8	1	CA	04										
9	1	E1	00										
10	1	E2	0A										
11	1	E3	40										
12	4	E7	00	00	00	00							
13	8	ED	48	00	E0	13	08	00	91	08			
14	6	FD	00	08	1C	00	00	01					
15	11	C3	11	24	04	0A	02	04	00	1C	10	F0	00
16	5	F0	55	AA	52	08	03						
17	1	E0	00										
18	6	F1	00	00	00	00	00	15					
19	1	F6	08										
20	5	F0	55	AA	52	08	05						
21	5	C3	00	10	50	50	50						
22	2	C4	00	14									
23	1	C9	04										
24	5	F0	55	AA	52	08	01						
25	3	B0	06	06	06								
26	3	B1	14	14	14								
27	3	B2	00	00	00								
28	3	B4	66	66	66								
29	3	B5	44	44	44								
30	3	B6	54	54	54								
31	3	B7	24	24	24								
32	3	B9	04	04	04								
33	3	BA	14	14	14								
34	3	BE	22	38	78								
35	1	35	00										

Display Timing



Name	Qt'y	Unit
Frame Rate	60	Hz
Line Time	12.75	us
H total	752	dot
H sync	5	dot
H back porch	11	dot
H active area	720	dot
H front porch	16	dot
V total	1312	line
V sync	5	line
V back porch	11	line
V active area	1280	line
V front porch	16	line

D. Touch Specifications

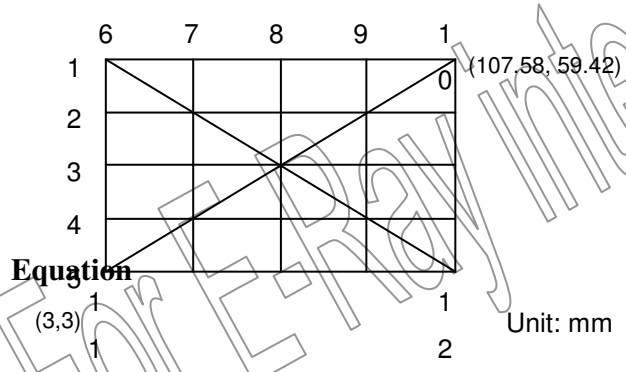
No.	Item		Spec.	Remark
1	Touch IC		S3402	Synaptics
2	Multi-Finger		10	
3	Report Rate		≧ 100Hz	
4	Performance	Accuracy.	≦2.0mm	Note 1
		Linearity	≦2.0mm	
5	Wakeup Gesture	Double tape	0.6se >Δt >(1/ report rate)	Δt=Ttape1-Ttape2
		Swipe	ΔS > 20mm & 50mm/sec>V>20mm/sec	ΔS :swipe distance V :swipe velocity

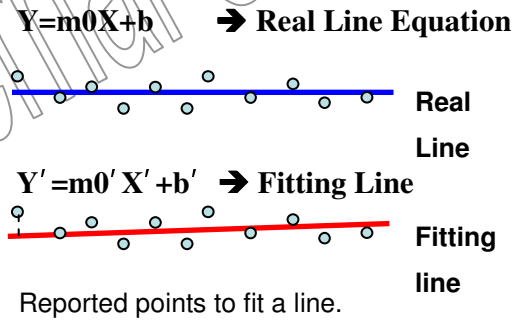
Note 1: Draw straight lines on the X axis, Y axis and diagonal axis with 6mm diameter copper slug at 50mm/sec drawing speed. And, drawing area is defined as below figure shown, which according to AA area and slig size.

Accuracy= Max{|(y-m0x-b)/(m0^2+1)^0.5|}

Linearity= Max{|(y-m0'x-b')/(m0'^2+1)^0.5|}

where (x,y)s are the TP IC reported coordinates,





E. Optical Specifications

Item			Min.	Typ.	Max.	Unit	Remark
Brightness			250	275	300	nits	Note 3
Contrast Ratio		@25deg	10000	--	--		Note 5
Color Temperature			7000	7500	8000	K	Note 3
Viewing Angle CR>1600		Top	80°	--	--	deg	Note 7
		Bottom	80°	--	--	deg	
		Left	80°	--	--	deg	
		Right	80°	--	--	deg	
Brightness Uniformity		275nits	70%	--	--		Note 6
Optical Switching Time		+25℃B/W(Tr+Tf)/2	--	--	1	ms	Note 4
Color	W	CIE1931 x	0.28	0.30	0.32		
		CIE1931 y	0.29	0.31	0.33		
	R	CIE1931 x	0.645	0.675	0.705		
		CIE1931 y	0.295	0.325	0.355		
	G	CIE1931 x	0.186	0.236	0.286		
		CIE1931 y	0.661	0.711	0.761		
	B	CIE1931 x	0.090	0.130	0.170		
		CIE1931 y	0.025	0.065	0.105		
NTSC		CIE x , y	80	100	--	%	
Color Uniformity @ White Pattern		Delt x			0.015		Note 6
		Delt y			0.015		
Life time	LT95	25C°	100	--	--	hrs	Note 9
Flicker			--	--	-30	db	Note 8
Crosstalk		Max (V, H)	--	--	5.0	%	Note 10
Gamma		γ	2.0	2.2	2.4		Note 11

Note 1: Ambient temperature =25℃±2℃, measured by CA-310.

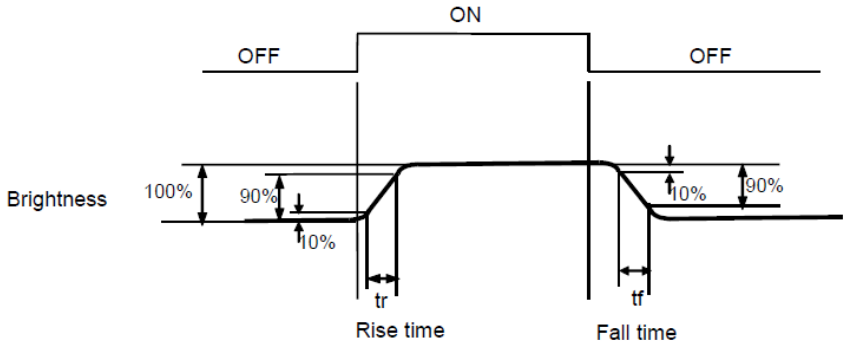
Note 2: To be measured in the dark room.

Note 3: The brightness measurement shall be done at the center of the display with a full white image.

Note 4: Optical Switching Time:

The optical switching time measurements should be performed at driven BLACK

and driven WHITE at typ. brightness setting by the driving techniques specified. The luminance should be measured with the emitting display and the detector at θ=0°and ψ=90°. The rise time tr is the time between a 10% optically response of the display and a 90% optically response of the display. The fall time tf is the time between a 10% optically response of the display and a 90% optically response to the display. The response time is defined as the average of the rise time and the fall time.

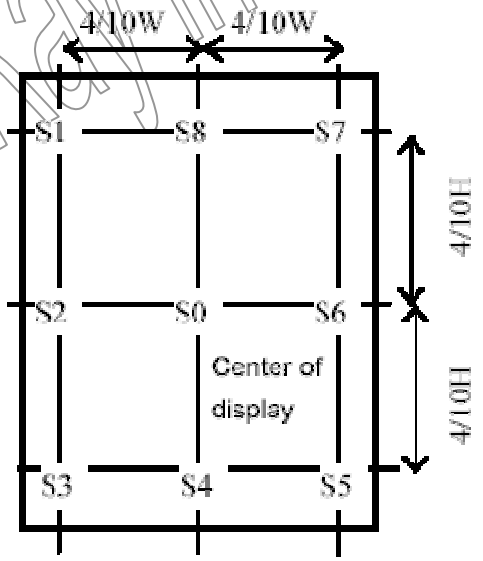


Note 5: Definition of contrast ratio:

Contrast ratio is calculated with the following formula:

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when OLED is at "White"}}{\text{Photo detector output when OLED is at "Black}}$$

Note 6: Uniformity. Refer to figure as below



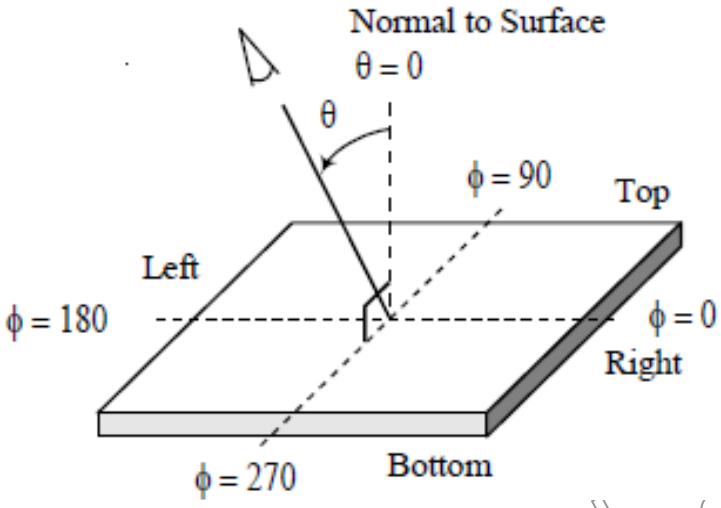
$$\text{Luminance uniformity} = \frac{\text{Minimum value from S0 to S8}}{\text{Maximum value from S0 to S8}} \times 100(\%)$$

Delt x = (Maximum value of CIEx from S0 to S8) – (Minimum value of CIEx from S0 to S8)

Delt y = (Maximum value of CIEy from S0 to S8) – (Minimum value of CIEy from S0 to S8)

Note 7: Definition of viewing angle :

The optical performance is specified as the driver IC located at =270°



Note 8: Flicker

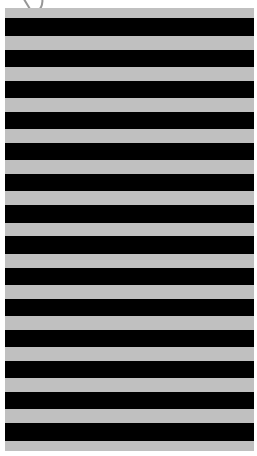
The flicker level is defined using Fast Fourier Transformation (FTT) as follows:

$$Flic\,\mathrm{ker} = 20\log_{10}\left(2\frac{f_{FFTC}(n)}{f_{FFTC}(0)}\right) + FS(Hz) \quad \text{(dB)}$$

where fFFTC(n) is the nth FFT coefficient, and fFFTC(0) is the 0th FFT coefficient which is DC component. FS(Hz) is the flicker sensitivity as a function of frequency.

The flicker level shall be measured with the test pattern in below.

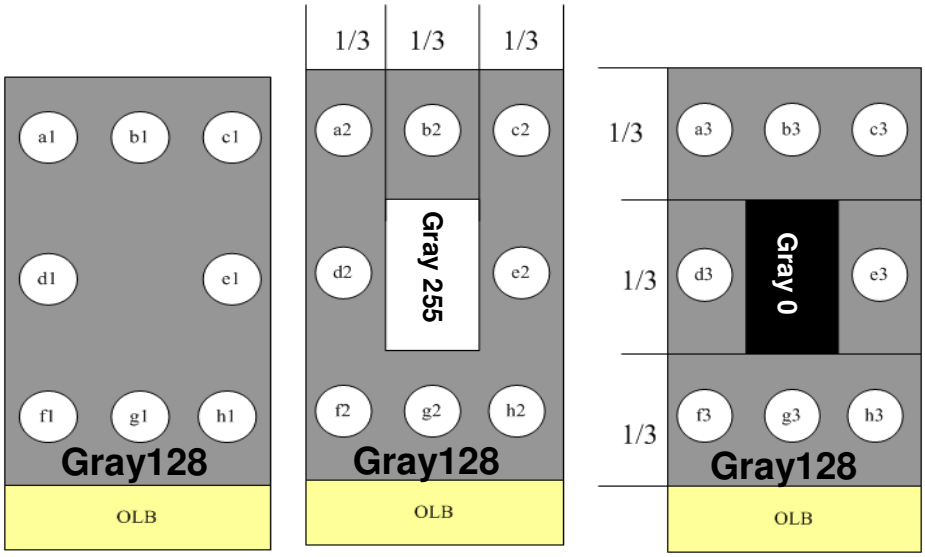
The gray leves of test pattern is 128.



Note 9: Time to 95% Luminance

Test @ full white pattern, the brightness decay from 100% to 95%.

Note 10: Cross-talk



$$CrossTalk\_White = \left\{ \begin{array}{l} 1-\left(\frac{b2}{a2} \div \frac{b1}{a1}\right) \times 100\%, 1-\left(\frac{b2}{c2} \div \frac{b1}{c1}\right) \times 100\%, \\ 1-\left(\frac{d2}{a2} \div \frac{d1}{a1}\right) \times 100\%, 1-\left(\frac{d2}{f2} \div \frac{d1}{f1}\right) \times 100\%, \\ 1-\left(\frac{e2}{c2} \div \frac{e1}{c1}\right) \times 100\%, 1-\left(\frac{e2}{h2} \div \frac{e1}{h1}\right) \times 100\%, \\ 1-\left(\frac{g2}{f2} \div \frac{g1}{f1}\right) \times 100\%, 1-\left(\frac{g2}{h2} \div \frac{g1}{h1}\right) \times 100\% \end{array} \right\}$$

$$CrossTalk\_Black = \left\{ \begin{array}{l} 1-\left(\frac{b3}{a3} \div \frac{b1}{a1}\right) \times 100\%, 1-\left(\frac{b3}{c3} \div \frac{b1}{c1}\right) \times 100\%, \\ 1-\left(\frac{d3}{a3} \div \frac{d1}{a1}\right) \times 100\%, 1-\left(\frac{d3}{f3} \div \frac{d1}{f1}\right) \times 100\%, \\ 1-\left(\frac{e3}{c3} \div \frac{e1}{c1}\right) \times 100\%, 1-\left(\frac{e3}{h3} \div \frac{e1}{h1}\right) \times 100\%, \\ 1-\left(\frac{g3}{f3} \div \frac{g1}{f1}\right) \times 100\%, 1-\left(\frac{g3}{h3} \div \frac{g1}{h1}\right) \times 100\% \end{array} \right\}$$

$$CrossTalk = MAX\{CrossTalk\_White, CrossTalk\_Black\}$$

Note 11: Gamma spec. is based on Gray level 255, 250, 244, 240, 232, 224, 206, 192, 160, 128, 95, 63, 47 & 31.

F. Reliability Test Items

Category	No.	Test items	Conditions	Remark
Reliability (Environment)	1	High Temp. Operation	Ta= 70℃ 168hrs	Judge criteria: No function defect
	2	High Temp. Storage	Ta= 70℃ 168hrs	
	3	Low Temp. Operation	Ta= -40℃ 168hrs	
	4	Low Temp. Storage	Ta= -40℃ 168hrs	
	5	High Temp./Humi. Operation	Ta= 40℃. 95% RH 168hrs	
	6	Thermal Shock	-40℃~70℃, Dwell for 30 min. 30 cycles. Non-operation	
	7	Low Pressure Storage	Condition: 40,000 ft, room temperature, 48hrs. Criterion: Normal performance after recovery time.	Non-operation
Reliability (Mechanical)	8	Shock Test	Half Sine, 400G, duration time 2 ms, One shock for each surfaces,total 6 shocks	Non-operation
	9	Random Vibration Test	0.025G2/Hz, 10~500Hz Nominal 3.5Grms in each axis, 30 minutes each axis	Non-operation
	10	Sinusoidal Vibration Test	0.5 octave / minutes sweep rate One sweep, 10 to 500Hz, all 3 axes (X, Y, Z) Fixture used: Fasten the specimen to the vibration table Power is OFF	Non-operation
	11	FPC Bending	Connector side: Bending FPC with 180° both clockwise and counterclockwise OLED side: Bending FPC with 180° both clockwise and counterclockwise minimum 30 cycles for every side.	Non-operation
	12	FPC connection insert/ Remove	Insert/Remove Panel's FPC for 15 cycles.	
ESD	13	IEC 61000-4-2 Air Discharge ±8KV Contact Discharge ±4KV	There is no degradation of OLED performance after this test. Panel level.	
Grounding	15	Metal frame grounding	The resistance between FPC ground pin and metal frame should be less than 1 Ohm before/after all reliability test	

G. Precaution

Please pay attention to the following items when you use the OLED Modules(Panel):

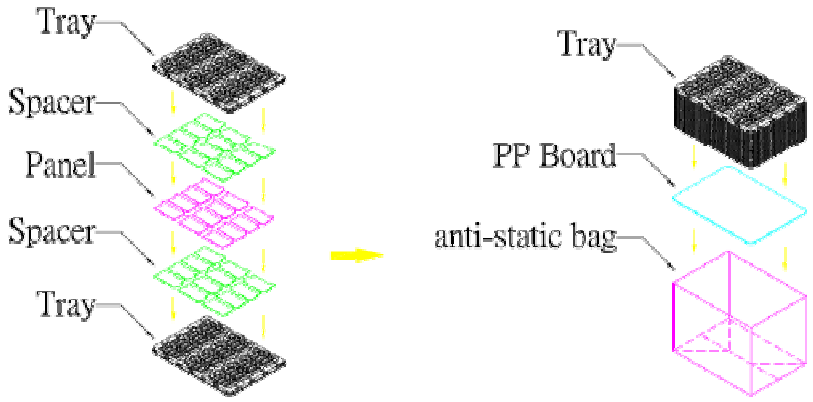
1. Do not twist or bend the module(panel) and prevent the unsuitable external force for display during assembly.
2. Adopt measures for good heat radiation. Be sure to use the module(panel) with in the specified temperature.
3. Avoid dust or oil mist during assembly.
4. Follow the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module(panel).
5. Less EMI: it will be more safety and less noise.
6. Please operate module(panel) in suitable temperature. The response time & brightness will drift by different temperature.
7. Avoid to display the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image sticking.
8. Please be sure to turn-off the power when connecting or disconnecting the circuit.
9. Polarizer scratches easily, please handle it carefully.
10. Display surface never likes dirt or stains.
11. A dew drop may lead to destruction. Please wipe off any moisture before using module(panel).
12. Sudden temperature changes cause condensation, and it will cause polarizer damaged.
13. High temperature and humidity may degrade performance. Please do not expose the module(panel) to the direct sunlight and so on.
14. Acetic acid or chlorine compounds are not friends with AMOLED display module(panel).
15. Static electricity will damage the module(panel), please do not touch the module(panel) without any grounded device.
16. Please avoid any static electricity damage (ESD) during producing and operating.
17. Do not disassemble and reassemble the module(panel) by self.
18. Be careful do not touch the rear side directly.
19. No strong vibration or shock. It will cause module(panel) broken.
20. Storage the modules(panel) in suitable environment with regular packing.
21. Be careful of injury from a broken display module(panel).
22. Please avoid the pressure adding to the surface (front or rear side) of modules(panel), because it will cause the display non-uniformity or other function issue.
23. Touch code is decided by (1) cover lens type, (2) lens lamination parameters, and (3) customers' hardware/software setting. Please be noted if above factors was changed, AUO need new samples to re-adjusted touch code.

H. Packing

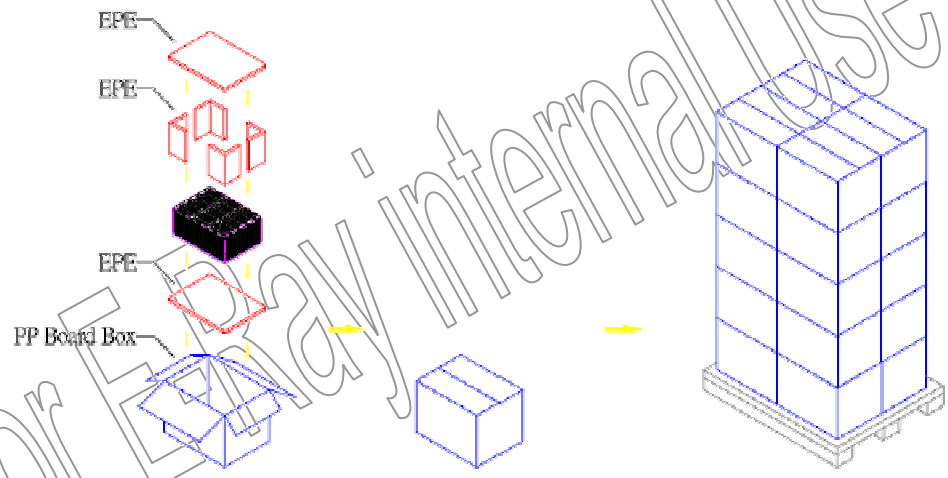
紙箱尺寸:546mm x 406mm x 278mm

棧板尺寸:1150mmx840mmx132mm

1set for 20 tray (8pcs) +1 tray(空) =160pcs module



(1tray 8 OLED, 2 spacer)



5 layer x4 boxes
=20 boxes

I. Outline Demension