Specification for Approval

Customer:_____

Model Name:_____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
Peter	Peng Jun		

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2023-10-30	NEW ISSUE	

Table of Contents

1. Scope

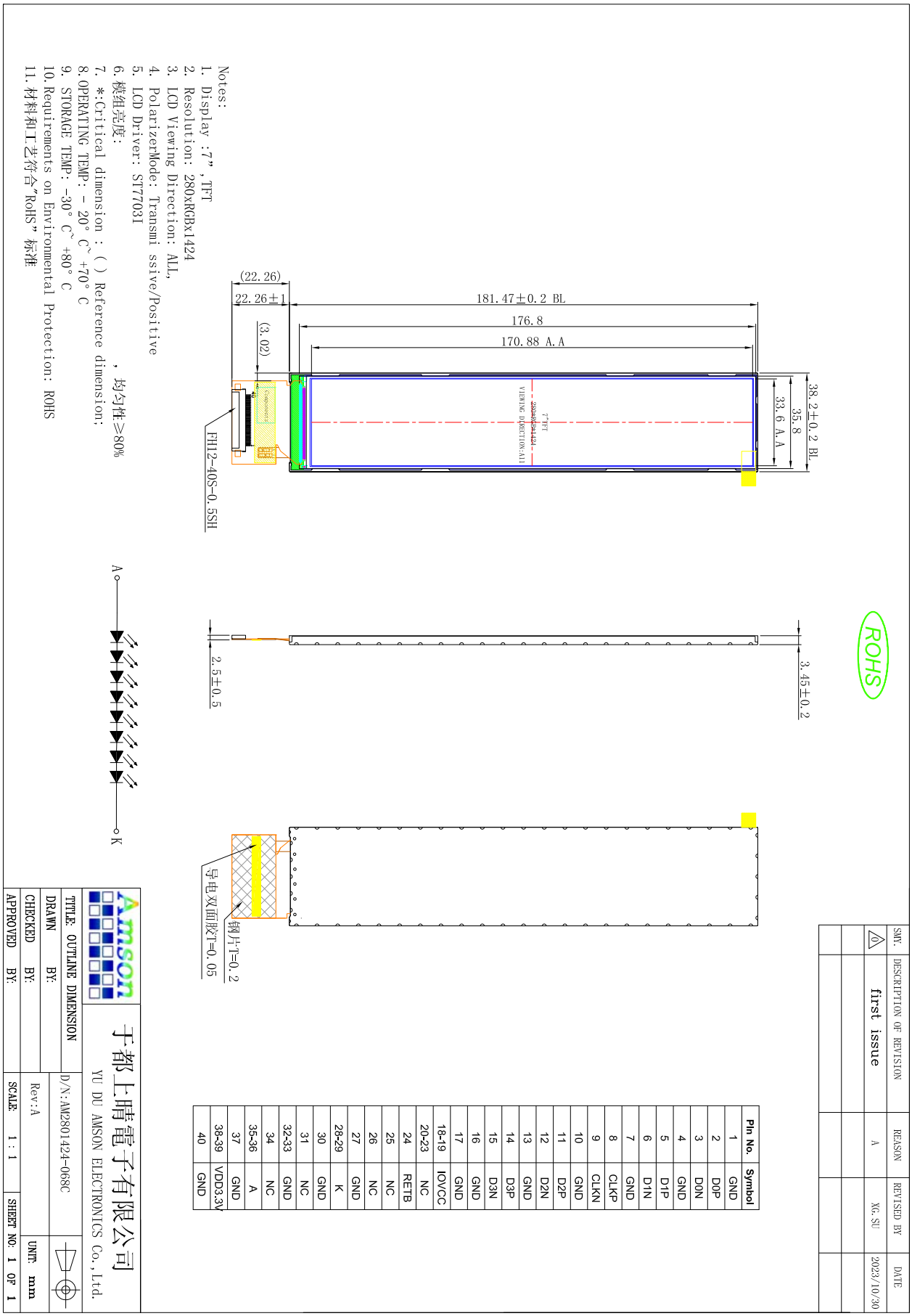
This specification defines general provisions as well as inspection standards for TFT module supplied by AMSON electronics.

If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

2. General Information

Item	Specification	Unit
LCD size	6.90	inch
Display Mode	Normally Black	--
Resolution	280(RGB)x1424	Pixel
Pixel pitch	40(H)x3x120(V)	mm
Pixel Arrangement	RGB Vertical Stripe	
Viewing direction	ALL	-
Module outline dimension	38.20(H)*181.47(V)*3.40(D)	mm
LCDAA	33.60(H)*170.88(V)	mm
Colors	16.7M	-
Driver IC	ST7703I	-
Interface	MIPI	--
Backlight	White LED	--
Operating Temperature	-20℃~+70℃	--
Storage Temperature	-30℃~+80℃	--
Environmental requirements	ROHS	--

3. External Dimensions



Pin No.	Symbol
1	GND
2	D0P
3	D0N
4	GND
5	D1P
6	D1N
7	GND
8	CLKP
9	CLKN
10	GND
11	D2P
12	D2N
13	GND
14	D3P
15	D3N
16	GND
17	GND
18-19	IOVCC
20-23	NC
24	RETB
25	NC
26	NC
27	GND
28-29	K
30	GND
31	NC
32-33	GND
34	NC
35-36	A
37	GND
38-39	VDD3.3V
40	GND

SMY.	DESCRIPTION OF REVISION	REASON	REVISED BY	DATE
0	first issue	A	XG. SU	2023/10/30

Amson 宇都上晴電子有限公司 YU DU AMSON ELECTRONICS Co.,Ltd.

TITLE: OUTLINE DIMENSION		D/N:AM2801424-068C	
DRAWN BY:		Rev:A	
CHECKED BY:		UNIT: mm	
APPROVED BY:	SCALE: 1:1	SHEET NO: 1 OF 1	

4. Interface Description

Pin No.	Symbol	Description
1	GND	Power ground
2	D0P	MIPI-DSI data lane 0 positive input pin
3	D0N	MIPI-DSI data lane 0 negative input pin
4	GND	Power ground
5	D1P	MIPI-DSI data lane 1 positive input pin
6	D1N	MIPI-DSI data lane 1 negative input pin
7	GND	Power ground
8	CLKP	MIPI-DSI data lane positive input pin
9	CLKN	MIPI-DSI data lane negative input pin
10	GND	Power ground
11	D2P	MIPI-DSI data lane 2 positive input pin
12	D2N	MIPI-DSI data lane 2 negative input pin
13	GND	Power ground
14	D3P	MIPI-DSI data lane 3 positive input pin
15	D3N	MIPI-DSI data lane 3 negative input pin
16	GND	Power ground
17	GND	Power ground
18-19	IOVCC	Power supply for the logic power and I/O circuit
20-23	NC	NC
24	RETB	Reset signal (low active)
25	NC	NC
26	NC	NC
27	GND	Power ground
28-29	K	LED backlight cathode
30	GND	Power ground
31	NC	NC
32-33	GND	Power ground
34	NC	NC
35-36	A	LED backlight anode
37	GND	Power ground
38-39	VDD3.3V	Power supply for the analog power
40	NC	NC

5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Note
Power Supply voltage 1	VCI~GND	-0.3	+6.5	V	
Power Supply voltage 2	IOVCC~GND	-0.3	+5.5	V	
Logic Input Voltage Range	V_{IN}	-0.3	IOVCC+0.3	V	
Logic Output Voltage Range	V_O	-0.3	IOVCC+0.3	V	

* The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6. DC Characteristics

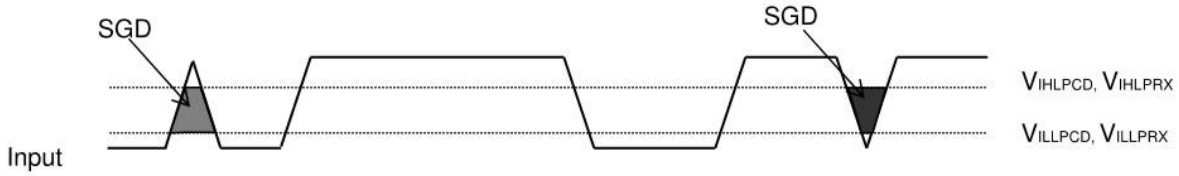
AGND=GND=0V,Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage for analog circuit	VCI	2.5	2.8	3.3	V
Supply voltage for logic circuit	IOVCC	1.65	1.8	2.0	V
Input voltage 'H' level	V_{IH}	0.7*IOVCC	—	IOVCC	V
Input voltage 'L' level	V_{IL}	GND	—	0.3*IOVCC	V
Output voltage 'H' level	V_{OH}	0.8*IOVCC	—	IOVCC	V
Output voltage 'L' level	V_{OL}	GND	—	0.2*IOVCC	V

7. Timing Characteristics

7.1 LP Mode

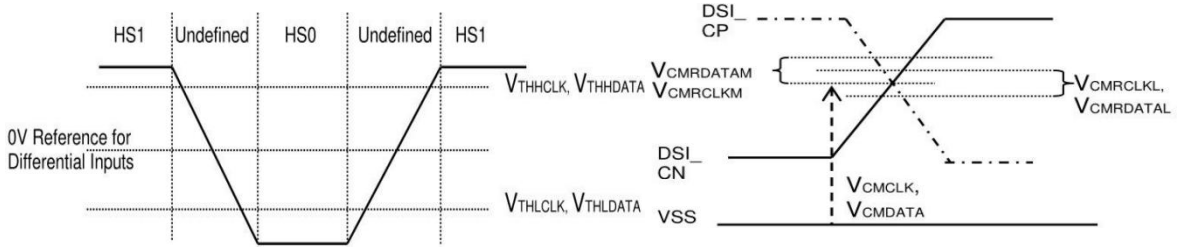
Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Logic high level input voltage	V_{IHLPCD}	LP-CD	450	-	1350	mV
Logic low level input voltage	V_{ILLPCD}	LP-CD	0	-	200	mV
Logic high level input voltage	V_{IHLPRX}	LP-RX(CLK, D0)	880	-	1350	mV
Logic low level input voltage	V_{ILLPRX}	LP-RX(CLK, D0)	0	-	550	mV
Logic low level input voltage	$V_{ILLPRXULP}$	LP-RX(CLK ULP mode)	0	-	300	mV
Logic high level output voltage	V_{OHLPTX}	LP-TX(D0)	1.1	-	1.3	V
Logic low level output voltage	V_{OLLPTX}	LP-TX(D0)	-50	-	50	mV
Logic high level input current	V_{IH}	LP-CD, LP-RX	-	-	10	uA
Logic low level input current	V_{IL}	LP-CD, LP-RX	-10	-	-	uA
Input pulse rejection	SGD	DSI-CLK+/-, DSI-D0+/1	-	-	300	Vps



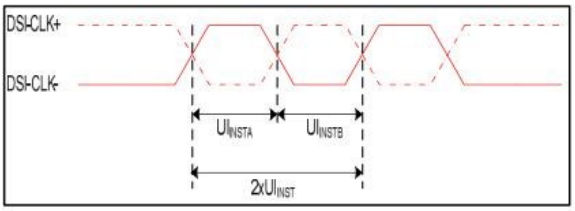
Input glitch rejections of low-power receivers

7.2 High Speed Mode

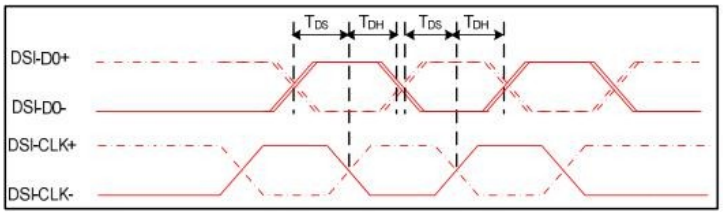
Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max.	
Input common mode	V_{CMCLK} V_{CMDATA}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	70	-	330	mV
Input common mode variation <450 MHZ	$V_{CMRCLKL}$ $V_{CMRDATAL}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-50	-	50	mV
Input common mode variation >450 MHZ	$V_{CMRCLKM}$ $V_{CMRDATAM}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	100	mV
Low-level differential Input threshold	V_{THLCLK} $V_{THLDATA}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-70	-	-	mV
High-level differential Input threshold	V_{THHCLK} $V_{THHDATA}$	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	70	mV
Single ended input low voltage	V_{ILHS}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-40	-	-	mV
Single ended input high voltage	V_{IHHS}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	460	mV
Differential input termination resistor	R_{TERM}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	80	100	125	Ω
Single-ended threshold voltage for termination enable	V_{TERMEN}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	450	mV
Termination capacitor	C_{TERM}	DSI_CP/DSI_CN DSI_D0P/DSI_D0P	-	-	-	pF



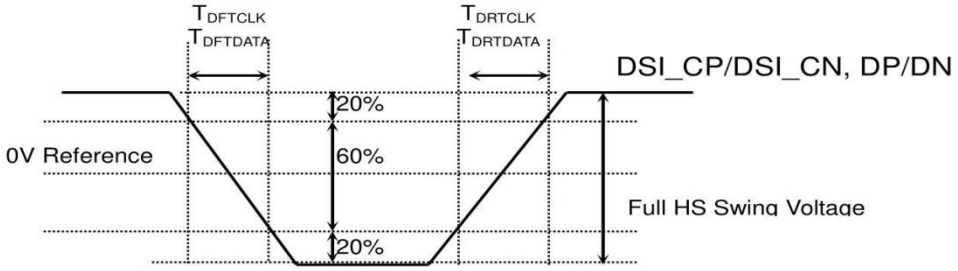
Differential voltage range and Command mode voltage



DSI clock channel timing



Rising and falling time on clock and data channel



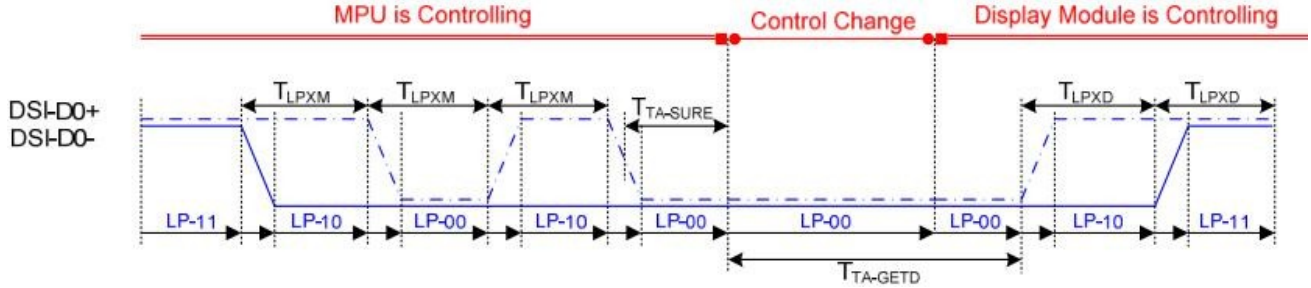
Rising and falling time on clock and data channel

(VSSA=0V, IOVCC=1.65V to 3.3V, VCI=2.5V to 3.3V, T_A = -30 to 70°C)

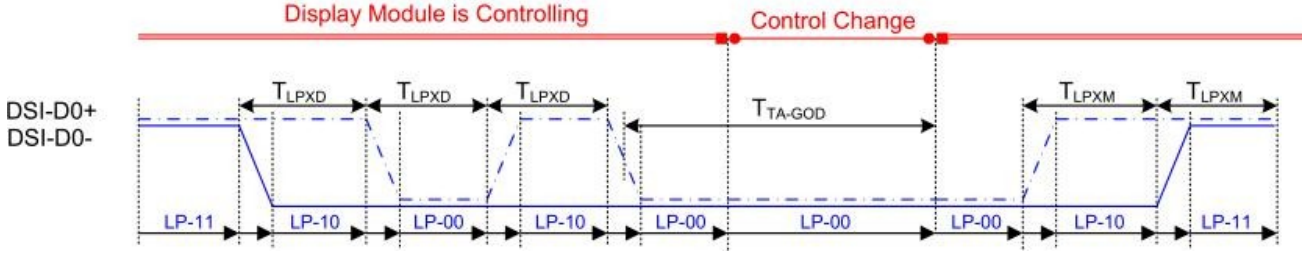
Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_CP/ DSI_CN	Double UI instantaneous	2xUINST	TBD	-	25	ns
	UI instantaneous	UINSTA UINSTB	TBD	-	12.5	ns
DP/DN	Data to clock setup time	TDS	0.15xUI	-	-	ps
	Data to clock hold time	TDH	0.15xUI	-	-	ps
DSI_CP/ DSI_CN	Differential rise time for clock	TDRTCLK	150	-	0.3UI	ps
	Differential fall time for clock	TDFTCLK	150	-	0.3UI	ps
DP/DN	Differential rise time for data	TDRTDATA	150	-	0.3UI	ps
	Differential fall time for data	TDFTDATA	150	-	0.3UI	ps

High Speed Mode Timing Characteristics

7.3 Low Power Mode



Bus Turnaround (BTA) from display module to MPU Timing



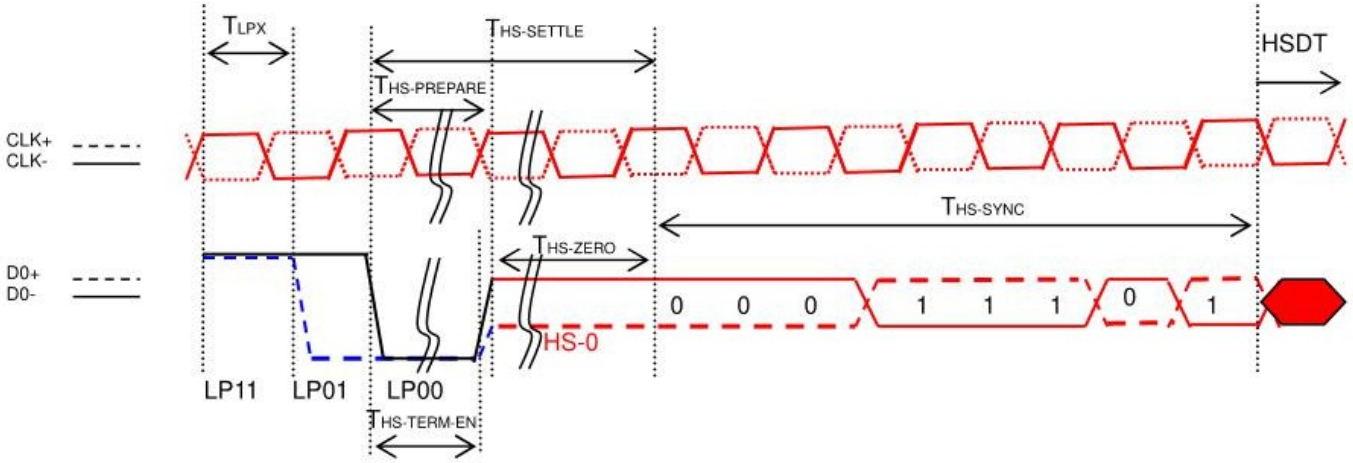
Bus Turnaround (BTA) from MPU to display module Timing

(VSSA=0V, IOVCC=1.65V to 2.0V, VCI=2.3V to 3.3V, T_A = -30 to 70°C)

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11 Host→ Display module	T_{LPXM}	50	-	-	ns
	Length of LP-00/LP01/LP10/LP11 Display module →Host	T_{LPXD}	50	-	-	ns
	Time-out before the MPU start driver	$T_{TA-SURE}$	T_{LPXD}	-	2xT_{LPXD}	ns
	Time to drive LP-00 by display module	T_{TA-GET}	5xT_{LPXD}	-	-	ns
	Time to drive LP-00 after turnaround request Host	T_{TAGO}	4xT_{LPXD}	-	-	ns

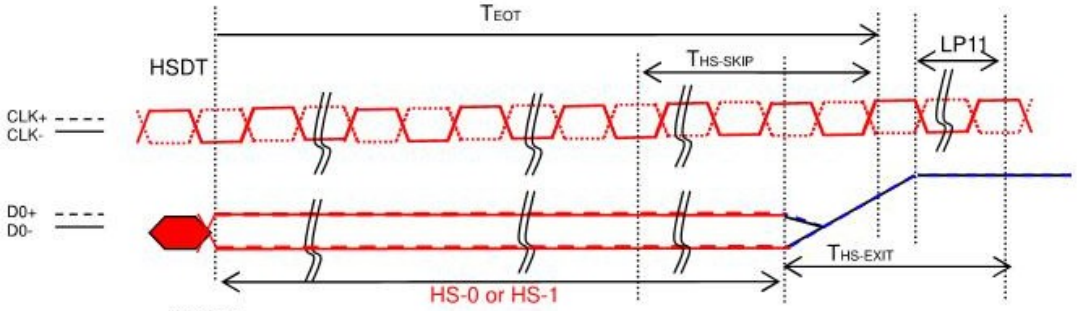
DSI Low Power Mode Characteristics

7.4 DSI Bursts Mode



Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Length of LP-00/LP01/LP10/LP11	T_{LPX}	50	-	-	ns
	Time to Driver LP-00 to prepare for HS transmission	$T_{HS-PREPARE}$	40+4UI	-	85+6UI	ns
	Time to enable data receiver line termination	$T_{HS-TERM-EN}$	-	-	35+4xUI	ns
	Time to drive LP-00 by display module	T_{TA-GET}	5xT_{LPXD}	-	-	ns
	Time to drive LP-00 after turnaround request Host	T_{TAGO}	4xT_{LPXD}	-	-	ns

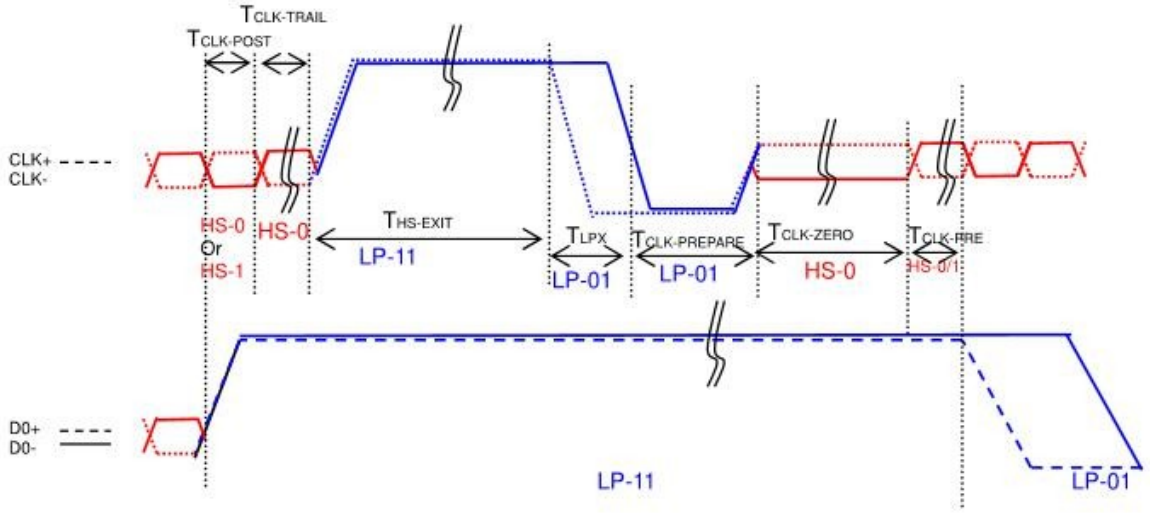
DSI Low Power Mode to /from High Speed Mode Timing



NOTE:
If the last bit is HS-0, the transmitter changes from HS-0 to HS-1
If the last bit is HS-0, the transmitter changes from HS-1 to HS-0

Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_D0P/ DSI_D0P	Time-Out at Display Module to Ignore Transition Period of EoT	$T_{HS-SKIP}$	40	-	55+4xUI	ns
	Time to Driver LP-11 after HS Burst	$T_{HS-EXIT}$	100	-	-	ns

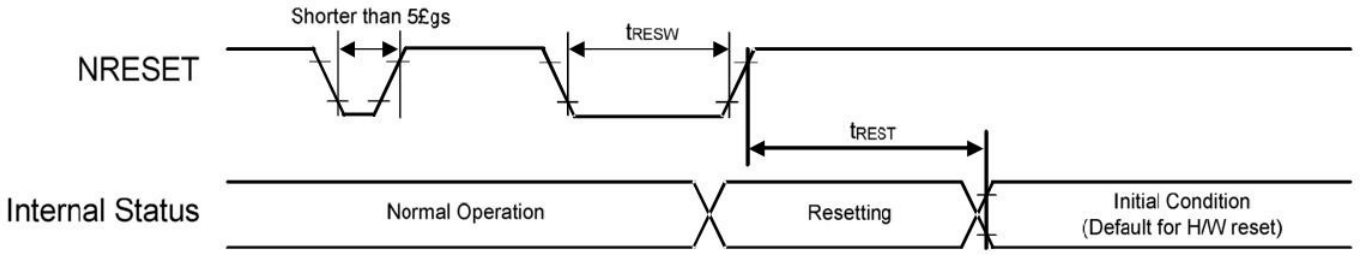
DSI Low Power Mode to High Speed Mode Timing



Signal	Item	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
DSI_CP/ DSI_CN	Time that the MCU shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	$T_{CLK-POST}$	60+52xUI	-	-	ns
	Time to drive HS differential state after last payload clock bit of a HS transmission burst	$T_{CLK-TRAIL}$	60	-	-	ns
	Time to drive LP-11 after HS burst	$T_{HS-EXIT}$	100	-	-	ns
	Time to drive LP-00 to prepare for HS transmission	$T_{CLK-PREPARE}$	38	-	95	ns
	Time-out at Clock Lane Display Module to enable HS Termination	$T_{CLK-TERM-EN}$	-	-	38	ns
	Minimum lead HS-0 drive period before starting Clock	$T_{CLK-PREPARE}$ + $T_{CLK-ZERO}$	300	-	-	ns
	Time that the HS clock shall be driven prior to any associated data Lane beginning the transition from LP to HS mode	$T_{CLK-PRE}$	8xUI			

Clock Lanes High Speed Mode to /from Low Power Mode Timing

7.5 Reset Timing



Symbol	Parameter	Related Pins	Spec.			Note	Unit
			Min.	Typ.	Max.		
tRESW	Reset low pulse width(1)	NRESET	10	-	-	-	µs
tREST	Reset complete time(2)	-	15	-	-	When reset applied during SLPIN mode	ms
		-	120	-	-	When reset applied during SLPOUT mode	ms

Notes:

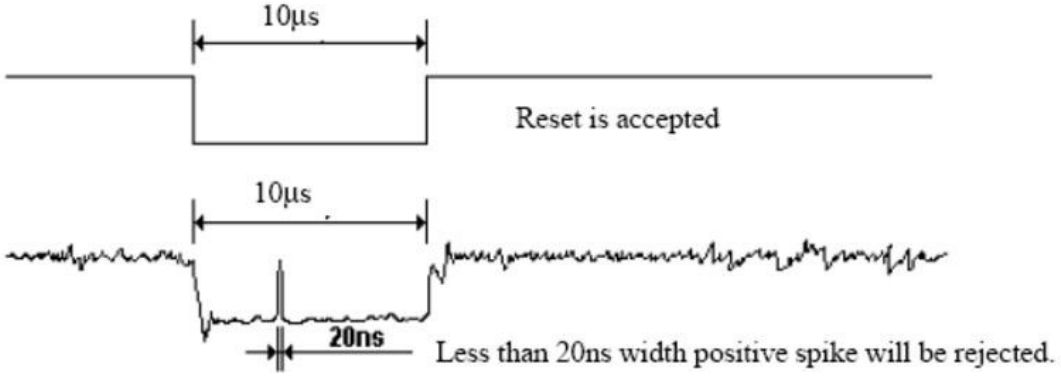
1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tREST) within 5 ms after a rising edge of NRESET.

2. Spike due to an electrostatic discharge on NRESET line does not cause irregular system reset according to the table below:

NRESET Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 10us	Reset
Between 5us and 10us	Reset starts

3. 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 Hardware Reset.

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



5. It is necessary to wait 15msec after releasing NRESET before sending commands. Also Sleep Out command cannot be sent for 120msec.

8. Backlight Characteristic

Ta=25℃

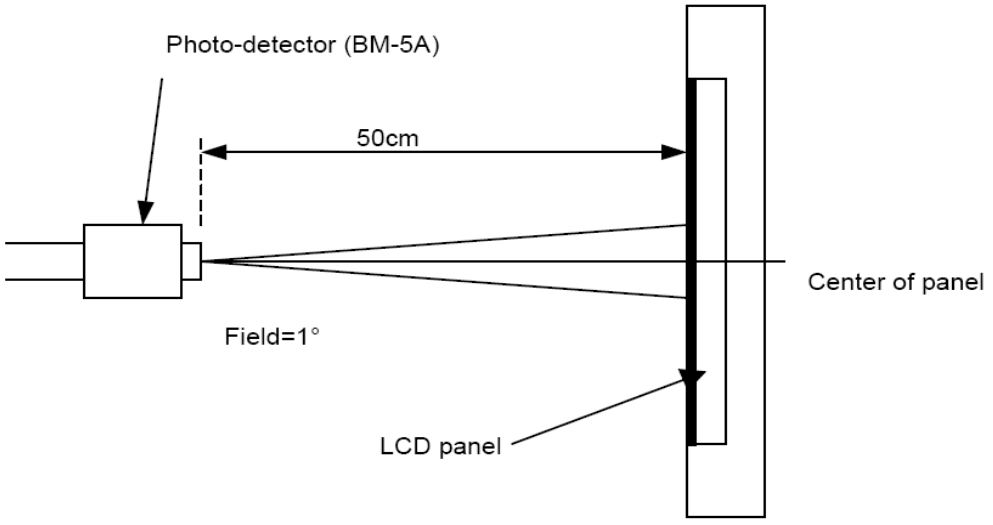
Item	Symbol	Min	Typ	Max	Unit	Condition
For ward voltage	Vf	-	22.2	-	V	If=30 mA
Luminance	LV	280	350	-	cd/㎡	
Number of LED	-	8 X 1			Piece	-
Connection mode	S/P	8 Serial / 1 Parallel			-	-

Using condition: constant current driving method If = 1×30 mA(+/-10%)

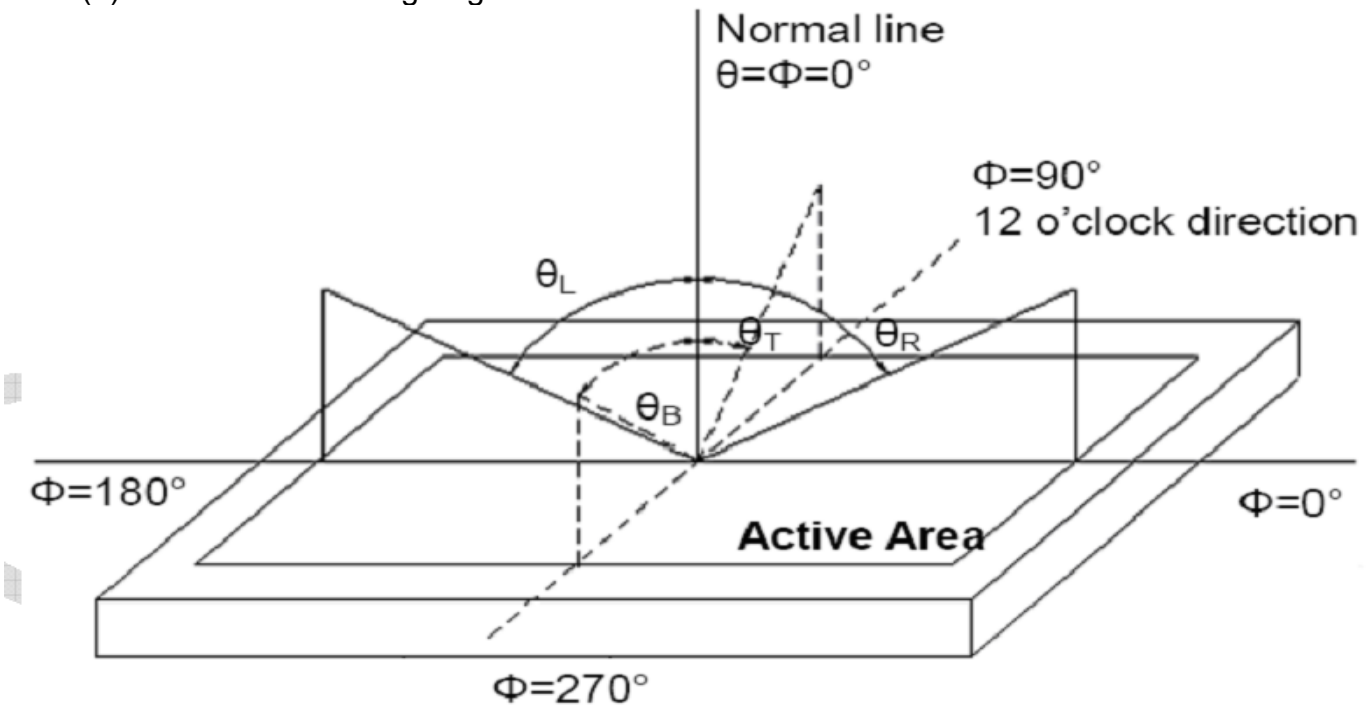
9. Optical Characteristics

Item		Symbol		Condition	Min	Typ	Max	Unit	Note
Transmittance (w/o polarizer)		T%		θ=0° Ta=25℃	3.6	4.1	-	%	(5)
Contrast ratio		Cr			900	1200	-	-	(3)
Response time		Ton + Toff			-	25	35	ms	(4)
Surface Luminance		LV			280	350	-	cd/㎡	(2)
Viewing angle range		Hor Ver	Θ_R	Center CR>10	80	85	-	deg	(1) (2) (6)
			Θ_L		80	85	-	deg	
			Θ_T		80	85	-	deg	
			Θ_B		80	85	-	deg	
CIE(x,y) chromaticity	Red	x		Viewing normal angle Θx=θy=0° Ta=25℃	-0.05	TBD	+0.05	-	(1) (6)
		y				TBD		-	
	Green	x				TBD		-	
		y				TBD		-	
	Blue	x				TBD		-	
		y				TBD		-	
	White	x				0.301		-	
		y				0.329		-	

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note (2) Definition of Viewing Angle



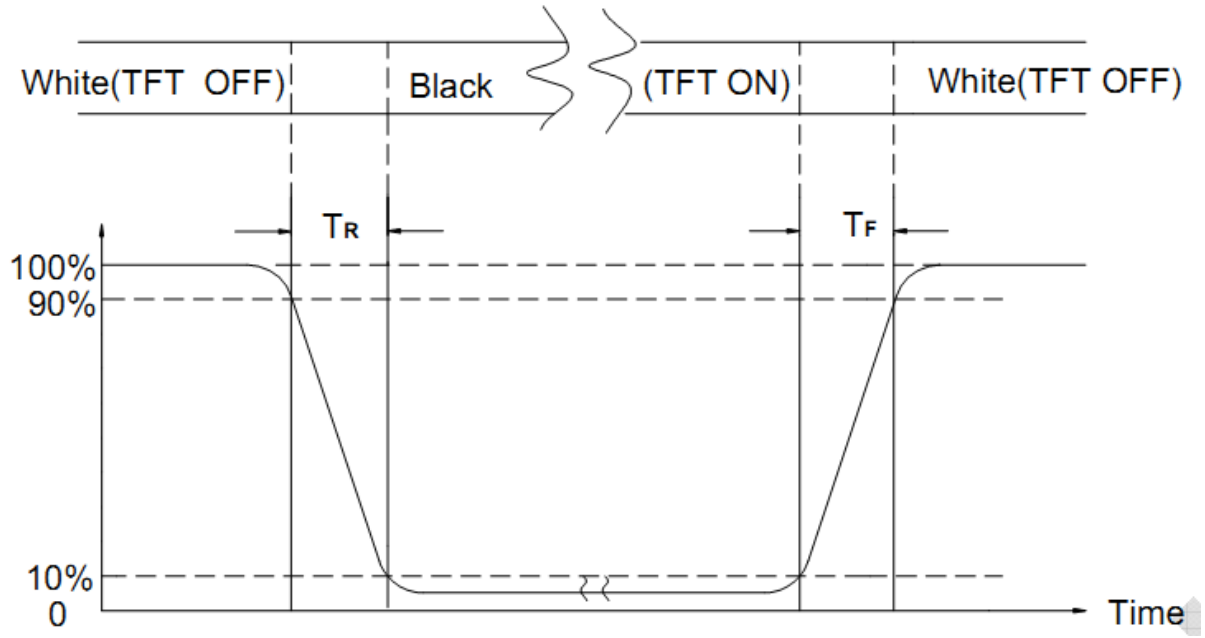
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63, L0: Luminance of gray level 0

Note (4) Definition of response time



Note (5) Definition of Transmittance (Module is without signal input)

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

10. Reliability Test Conditions and Methods

Reliability test conditions (Polarizer characteristics null)

No.	Items	Condition	Inspection after test
1	High Temperature Storage	T = 80℃for 48 hr	Inspection after 4 hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value.
2	Low Temperature Storage	T = -30℃for 48 hr	
3	High Temperature Operating	T = 70℃for 48 hr	
4	Low Temperature Operating	T = -20℃for 48 hr (But no condensation of dew)	
5	High Temp. and High Humidity Storage	T =60℃/90% for 48 hr (But no condensation dew)	
6	Thermal Shock	-20±2℃~25~70±2℃×10cycles (30min.) (5min.) (30min.)	
7	Dropping test (non-operation)	Drop to the ground from 76cm height, one time, every side of carton. (Packing condition)	
8	Packing Vibration (non-operation)	Frequency：10Hz~55Hz~10Hz Amplitude：1.0mm, X，Y，Z direction for total 3hours (Packing condition)	
9	ESD	Voltage:±6KV R: 330Ω C: 150pF Air discharge, 10time	

Note:

(1)The test samples should be applied to only one test item.

(2)Sample size for each test item is 5~10pcs.

(3)In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.
Using ionizer(an antistatic blower) is recommended at working area in order to reduce electro-static voltage.
When removing protection film from LCM panel, peel off the tag slowly (recommended more than one second) while blowing with ionizer toward the peeling face to minimize ESD which may damage electrical circuit.

(4) Please use automatic switch testing mode when test operating mode.

11. Inspection Standard

This specification is made to be used as the standard acceptance/rejection criteria for Normal LCM Product.

1 Sample plan

Sampling plan according to GB/T2828.1-2003/ISO 2859-1：1999 and ANSI/ASQC Z1.4-1993,normal level 2 and based on:

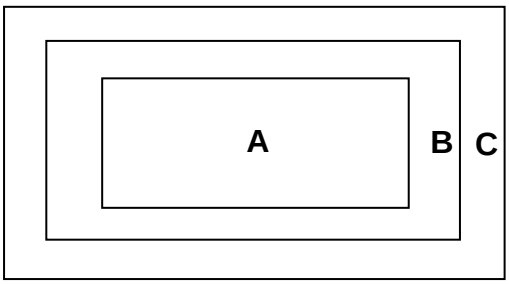
Major defect: AQL 0.65

Minor defect: AQL 1.0

2. Inspection condition

Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45° against perpendicular line. (Normal temperature 20~25°C and normal humidity 60±15%RH).

3. Definition of inspection zone in LCD.



Zone A: character/Digit area

Zone B: viewing area except Zone A (Zone A + Zone B=minimum Viewing area)

Zone C: Outside viewing area (invisible area after assembly in customer's product)

Fig.1 Inspection zones in an LCD.

Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer's product.

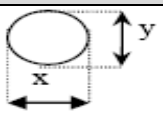
4. Standards of inspection items

4.1 Major Defect

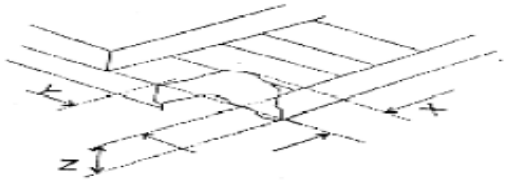
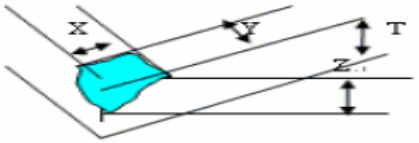
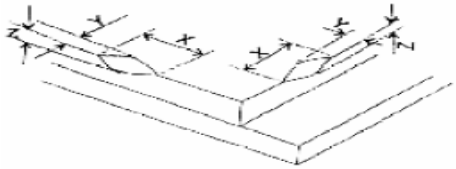
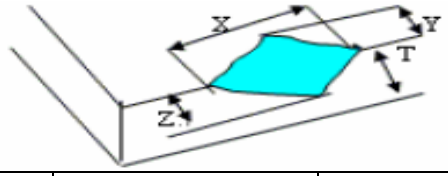
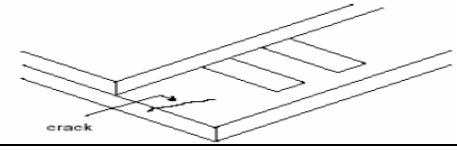
Item No	Items to be inspected	Inspection Standard	Classification of defects
4.1.1	All functional defects	1.No display	Major
		2.Display abnormally	
		3.Missing vertical，horizontal segment	
		4.Short circuit	
		5. Back-light no lighting, flickering and abnormal lighting.	
4.1.2	Missing	Missing component	
4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	

4.1.4	linearity	No more than 1.5%	

4.2 Cosmetic Defect

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th>Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="3">4.2.1</td><td>Clear Spots Black and white Spot defect Pinhole, Foreign Particle, polarizer Dirt</td><td>For dark/white spot, sizeΦis defined as Φ=(x + y)/2 
1
<table><tr><td>Zone / Size(mm)</td><td colspan="2">Acceptable Qty</td><td></td></tr><tr><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>Φ≤0.15</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.15＜Φ≤0.20</td><td colspan="2">2</td></tr><tr><td>0.20＜Φ≤0.30</td><td colspan="2">0</td></tr><tr><td>Φ＞0.30</td><td colspan="2">0</td></tr></table></td><td>Minor</td></tr>
<tr><td>Clear Spots TP Dirt</td><td>2
<table><tr><td>Zone / Size(mm)</td><td colspan="2">Acceptable Qty</td><td></td></tr><tr><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>Φ≤0.15</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.15＜Φ≤0.20</td><td colspan="2">2</td></tr><tr><td>0.20＜Φ≤0.30</td><td colspan="2">0</td></tr><tr><td>Φ＞0.30</td><td colspan="2">0</td></tr></table></td><td>Minor</td></tr>
<tr><td>Dim Spots Circle shaped and dim edged defects</td><td>3
<table><tr><td>Zone / Size(mm)</td><td colspan="2">Acceptable Qty</td><td></td></tr><tr><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.20＜Φ≤0.40</td><td colspan="2">2</td></tr><tr><td>0.40＜Φ≤0.60</td><td colspan="2">0</td></tr><tr><td>Φ＞0.60</td><td colspan="2">0</td></tr></table></td><td>Minor</td></tr>
</table>

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th colspan="5">Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="8">4.2.2</td><td rowspan="4">Line defect
Black line,
White line,
Foreign material on polarizer</td><td colspan="2">Size(mm)</td><td colspan="3">Acceptable Qty</td><td rowspan="4">Minor</td></tr>
<tr><td rowspan="2">L(Length)</td><td rowspan="2">W(Width)</td><td colspan="3">Zone</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Ignore</td><td>W≤0.05</td><td>Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>L ≤5.0</td><td>0.05＜W≤0.08</td><td colspan="2">2</td></tr>
<tr><td></td><td>W＞0.08</td><td colspan="2">0</td><td rowspan="3">Ignore</td><td rowspan="3">Minor</td></tr>
<tr><td rowspan="3">Foreign material on TP film</td><td colspan="5">The line can be seen after mobile phone in the operating condition:</td></tr>
<tr><td colspan="2">Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td rowspan="2">L(Length)</td><td rowspan="2">W(Width)</td><td colspan="3">Zone</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Ignore</td><td>W≤0.05</td><td>Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>L ≤5.0</td><td>0.05＜W≤0.08</td><td colspan="2">3</td></tr>
<tr><td></td><td>W＞0.08</td><td colspan="2">0</td><td rowspan="3">Ignore</td><td rowspan="3">Minor</td></tr>
<tr><td rowspan="6">4.2.3</td><td rowspan="6">Dim line defect
Polarizer scratch
TP film scratch</td><td colspan="5">If the scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 4.2.2. If the scratch can be seen only in non-operating condition or some special angle, judge by the following.</td></tr>
<tr><td colspan="2">Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td rowspan="2">L(Length)</td><td rowspan="2">W(Width)</td><td colspan="3">Zone</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Ignore</td><td>W≤0.03</td><td>Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>5.0＜
L≤10.0</td><td>0.03＜W≤0.05</td><td colspan="2">2</td></tr>
<tr><td>L≤5.0</td><td>0.05＜W≤0.08</td><td colspan="2">1</td><td rowspan="2">Ignore</td><td rowspan="2">Minor</td></tr>
<tr><td></td><td>W＞0.08</td><td colspan="2">0</td></tr>
<tr><td rowspan="5">4.2.4</td><td rowspan="5">Polarize Air bubble</td><td colspan="5">Air bubbles between glass & polarizer</td></tr>
<tr><td colspan="2">Zone
Size(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td colspan="2"></td><td>A</td><td>B</td><td>C</td></tr>
<tr><td colspan="2">Φ≤0.20</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td><td rowspan="3">Minor</td></tr>
<tr><td colspan="2">0.20＜Φ≤0.3</td><td colspan="2">2</td></tr>
<tr><td colspan="2">Φ＞0.30</td><td colspan="2">0</td></tr>
</table>

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th colspan="3">Inspection Standard</th><th>Classification of defects</th></tr>
<tr><td rowspan="11">4.35</td><td rowspan="11">Glass defect</td><td colspan="3">(i) Chips on corner
A:LCD Glass defect
  </td><td rowspan="11">Minor</td></tr>
<tr><td>X(mm)</td><td>Y(mm)</td><td>Z(mm)</td></tr>
<tr><td>≤3.0</td><td>≤3.0</td><td>Disregard</td></tr>
<tr><td colspan="3">Notes: S=contact pad length
Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.
B:TP Glass defect
  </td></tr>
<tr><td>X(mm)</td><td>Y(mm)</td><td>Z(mm)</td></tr>
<tr><td>≤3.0</td><td>≤3.0</td><td>Disregard</td></tr>
<tr><td colspan="3">(ii)Usual surface cracks
A:LCD Glass defect
  </td></tr>
<tr><td>X(mm)</td><td>Y(mm)</td><td>Z(mm)</td></tr>
<tr><td>≤3.0</td><td><Inner border line of the seal</td><td>Disregard</td></tr>
<tr><td colspan="3">B:TP Glass defect
  </td></tr>
<tr><td>X(mm)</td><td>Y(mm)</td><td>Z(mm)</td></tr>
<tr><td>≤6.0</td><td>＜2.0</td><td>Disregard</td></tr>
<tr><td colspan="3">(iii) Crack
Cracks tend to break are not allowed.
  </td></tr>
</table>

12. Handling Precautions

12.1 Mounting method

The LCD panel of AMSON TFT module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent

[Recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

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

Do not use the following solvent:

- Water
- 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 or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Sulfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to power or ground, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

12.4 packing

- Module employs LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the maximum operating temperature, 50%Rh or less is required.

12.6 storing

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.
  [It is recommended to store them as they have been contained in the inner container at the time of delivery from us

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

13. Precaution for Use

13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

- When a question is arisen in this specification.
- When a new problem is arisen which is not specified in this specifications?
- When an inspection specifications change or operating condition change in customer is reported to AMSON TFT and some problem is arisen in this specification due to the change.
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

14. Packing Method

TBD.