SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO., LTD

SPECIFICATION

FOR

LCD Module

KD030C-2-01

MODULE:	KD030C-2-01
CUSTOMER:	

REV	DESCRIPTION	DATE
1.0	FIRST ISSUE	2016.03.04

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

常 备 库 存　　　　长 期 供 货　　　　支持小量　　　　品 种 齐 全
Standing Stock　　Long Availability　　NO MOQ　　In Full Range

SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

Revision History

Data	Rev. No.	Page	Summary
2016.03.24	V1.0	ALL	FIRST ISSUE

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常 备 库 存	长 期 供 货	支持小量	品 种 齐 全
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SHENZHEN STARTEK ELECTRONIC TECHNOLOGY CO.,LTD

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General Description

* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 3.0'TFT-LCD contains 240x400 pixels, and can display up to 65K/262K colors.

* Features

-Low Input Voltage: 2.8V~3.3V(TYP)
-Display Colors of TFT LCD: 65K/262K colors
-Interface: 8-bits, 9-bits, 16-bits, 18-bits MCU interface.
      16-bits, 18-bits RGB interface with graphic controller.
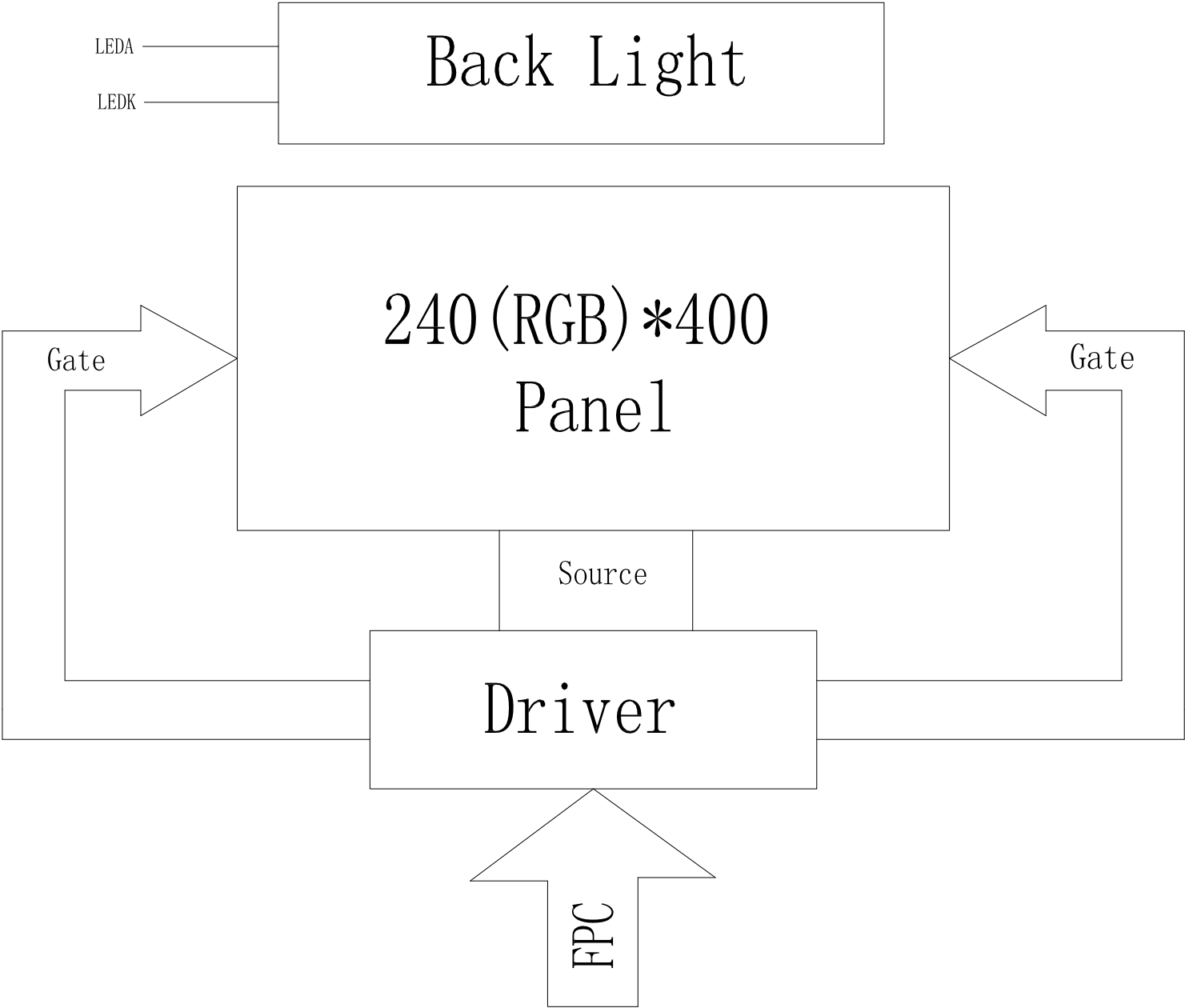   3-line/4-line serial interface.

General Information Items	Specification Main Panel	Unit	Note
Display area(AA)	38.88(H)*64.80(V) (3.0inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	65K/262k	colors	-
Number of pixels	240(RGB)*400	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.051(H)*0.051(V)	mm	-
Viewing angle	12:00	o'clock	-
Controller IC	ILI9327	-	-
Display mode	Transmissive/Normally White	-	-
Operating temperature	-20～+70	℃	-
Storage temperature	-30～+80	℃	-

* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		45.4		mm	-
	Vertical(V)		77		mm	-
	Depth(D)		2.60		mm	-
Weight			TBD		g	-

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1. Block Diagram

```
LEDA ────────┐
             ├──────  Back Light
LEDK ────────┘


Gate ──▷   240(RGB)*400   ◁── Gate
              Panel


                Source

                Driver

                 ▲
                FPC
```

常 备 库 存	长 期 供 货	支持小量	品 种 齐 全
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2. Outline dimension

NO.	Pin Name
1	IM0
2	IM1
3	IM2
4	RESET
5	VSYNC
6	HSYNC
7	PCLK
8	DE
9	DB17
10	DB16
11	DB15
12	DB14
13	DB13
14	DB12
15	DB11
16	DB10
17	DB09
18	DB08
19	DB07
20	DB06
21	DB05
22	DB04
23	DB03
24	DB02
25	DB01
26	DB0
27	SDO
28	DIN(SDA)
29	RD
30	WR(SCL)
31	RS
32	CS
33	VCC
34	VCC
35	GND
36	GND
37	LEDK4
38	LEDK3
39	LEDK2
40	LEDK1
41	LEDA
42	XR(NC)
43	YD(NC)
44	XL(NC)
45	YU(NC)

FPC 弯折示意图

IM2	IM1	IM0	Interface type	DB Pin in use
0	0	0	DBI Typ_ 18-bit interface	DB17-DB0
0	0	1	DBI Typ_ 9-bit interface	DB8-DB0
0	1	0	DBI Typ_ 16-bit interface	DB15-DB0
0	1	1	DBI Typ_ 8-bit interface	DB7-DB0
1	0	1	3-Wire 9 BIT data serial interface	SDI SCL CS
1	1	1	4-Wire 8 BIT data serial interface	SDI SCL CS RS

NOTE:
1.If not use PIN, fix to the GND ,IOVCC or NC.
2.If use RGB interface must select serial interface

更改为CPT LCD生产

54.00　　0.80 MAX

11.52

1.35　45.70

Double side tape(t=0.1MM)

2-2.50±0.3

Complement area

单面区

39.18

5.00

2.60±0.1(不包含双面胶)

BACK

FRONT

模块使用方向

2.93

3.50

CONTACT SIDE　PI ??

0.3±0.03

W=0.30

P(45K45)×2=22.00±0.05

23.00

LED CIRCUIT DIAGRAM:

LEDK1○、LEDK2○、LEDK3○、LEDK4○　○LEDA

3.08

REMOVE TAPE

45.04±0.2 BL

43.00 LCD

40.88 LCD V.A

38.88LCD A.A

VIEWING DIRECTION 12:00

TFT 3.0 inch

240X400 DOTS

2.90

LCD A.A

66.80 LCD V.A

68.80 LCD CF

73.20 LCD

77.00±0.2 BL

13.27　40.09

55.50

0.50

11.02

Display type:TFT/Normal white
Display mode:Transmissive
Viewing direction:12:00
Driver IC: ILI9327
Backlight: White LED(4-LED Palalled)
　　Vled=3.2±0.2V Iled=60mA
Operating temprature: -20°C ~ +70°C
Storage temprature: -30°C ~ +80°C
Interface connector: FPC
Unspecified tolerance is ±0.3mm

深圳市柯达科电子科技有限公司
SHENZHEN STARTEK ELECTRONICS CO.,LTD

DRAWING NAME	KD030C-2-01-LCM	
PARTS NO.	9903006A	
Drawn		Unit
Checked		mm
Approve		Page 1/1

TOLERANCE UNLESS OTHERWISE SPECIFIED	X.X±0.3	X.XX±0.2

Scale 1:1

Rev.	Revision content description	Date
A	FIRST	2014/06/26

常 备 库 存　Standing Stock　　长 期 供 货　Long Availability　　支持小量　NO MOQ　　品 种 齐 全　In Full Range

3. Input terminal Pin Assignment

NO.	SYMBOL	Description	
1	IM0	Interface selecting signal.	I
2	M1		
3	IM2		
4	RESET	This signal low will reset the device and must be applied to properly initialize the chip. Signal is low active	I
5	VSYNC	Vertical sync. signal in DPI interface mode. In MDDI operation, VSYNC is assigned for the sub-display interface output (S_CS) In MDDI mode, this is an output pin, If it's not used; please let this pin as open. In other mode, this is an input pin, If it's not used; please fix this pin as GND.	I
6	HSYNC	Horizontal sync. signal in DPI interface mode. In MDDI operation, VSYNC is assigned for the sub-display interface output (S_RS) In MDDI mode, this is an output pin, If it's not used; please let this pin as open. In other mode, this is an input pin, If it's not used; please fix this pin as GND.	I
7	PCLK	Pixel clock signal in DPI interface mode. If not used, please fix this pin at GND level.	I
8	DE	Data enable signal in DPI interface mode. In MDDI operation, VSYNC is assigned for the sub-display interface output (S_WR) In MDDI mode, this is an output pin, If it's not used; please let this pin as open. In other mode, this is an input pin, If it's not used; please fix this pin as GND.	I
9-26	DB17-DB0	These pins are data bus. In MDDI operation, DB[17:9]/S_DB[8:0] can be assigned for the sub-display interface output. In MDDI mode, these pins are output, If they are not used; please let these pins as open. In other mode, these pins are input, If they are not used; please fix these pins as GND.	I/O
27	SDO	Serial data output pin and used for the DBI type C mode.	O
28	DIN	Serial data input pin and used for the DBI type C mode.	I

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		If not used, please connect this pin to ground.	
29	RD	Read control pin for the DBI interface. If not used, please connect this pin to VCC.	I
30	WR(SCL)	Write control pin for the DBI interface. When the DBI type C is selected, this pin is used as serial c lock pin. If not used, please connect this pin to VCC.	I
31	RS	Display data / Command selection pin D/CX='1': Display data. D/CX='0': Command data. If not used, please fix this pin at GND level.	I
32	CS	Chip select input pin ("Low" enable). When it is not used, please fix this pin at VCC.	I
33	VCC	Power supply voltage(VCI=2.5V-3.3V).	P
34	VCC		
35	GND	Ground.	P
36	GND		
37	LEDK4	LED Cathode 4.	P
38	LEDK3	LED Cathode 3.	P
39	LEDK2	LED Cathode 2.	P
40	LEDK1	LED Cathode 1.	P
41	LEDA	LED Anode.	P
42	XR(NC)	NC.	
43	YD(NC)	NC.	
44	XL(NC)	NC.	
45	YU(NC)	NC.	

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常 备 库 存 Standing Stock	长 期 供 货 Long Availability	支持小量 NO MOQ	品 种 齐 全 In Full Range

4. LCD Optical Characteristics

4.1 Optical specification

(Note1 · Note2)

(Using CPT LC+ EWV Polarizer+Corresponding Backlight, reference only)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance		T		(5.2)	(5.5)		%	
Contrast Ratio		CR	*1)		(250)	-	--	Note 3
Response Time		Tr+ Tf	*3)	-	(30)		ms	Note 4
Viewing Angle	Vertical	θ *2)	CR≧10	(100)	(110)	-		
						-		Note 5
	Horizontal	ϕ *2)		(120)	(130)	-		
						-		
Color Filter Chromacicity	White	x	$\theta=\phi=0$	(0.288)	(0.308)	(0.328)		Note 6
		y		(0.322)	(0.342)	(0.362)		
		Y		(27.8)	(30.8)	(33.8)		
	Red	x	$\theta=\phi=0$	(0.633)	(0.653)	(0.673)		
		y		(0.311)	(0.331)	(0.351)		
		Y		(15.4)	(18.4)	(21.4)		
	Green	x	$\theta=\phi=0$	(0.291)	(0.311)	(0.331)		
		y		(0.554)	(0.574)	(0.594)		
		Y		(55.0)	(59.0)	(63)		
	Blue	x	$\theta=\phi=0$	(0.114)	(0.134)	(0.154)		
		y		(0.114)	(0.134)	(0.154)		
		Y		(12.3)	(15.3)	(18.3)		
	NTSC			-	(61%)	-		

4.2 Measuring Condition

■ Measuring surrounding : dark room

■ Ambient temperature : 25±2℃

■ 15min. warm-up time

4.3 Measuring Equipment

    FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

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常 备 库 存 Standing Stock	长 期 供 货 Long Availability	支持小量 NO MOQ	品 种 齐 全 In Full Range

Note 1.Ambient condition：25℃±2℃，60±10%RH，under 10 Lunx in the darkroom。

Note 2.Measure device：BM-5A (TOPCON)，viewing cone= $1°$，I_L=20mA。

L=500mm
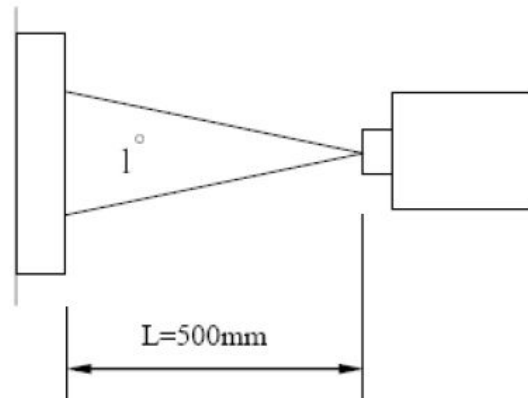
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常 备 库 存	长 期 供 货	支持小量	品 种 齐 全
Standing Stock	Long Availability	NO MOQ	In Full Range

Note 3. Definition of Contrast Ratio :
    CR = White Luminance (ON) / Black Luminance (OFF)

Note 4. Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.
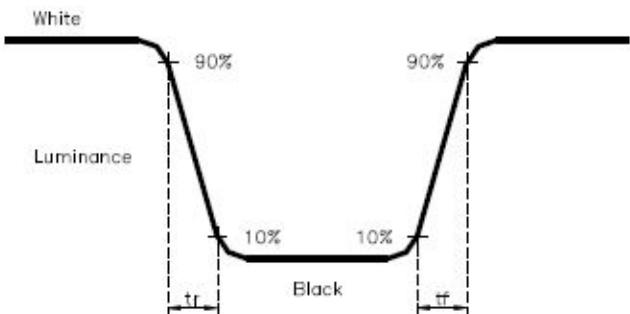
Note 5. Definition of view angle(θ，ψ) :
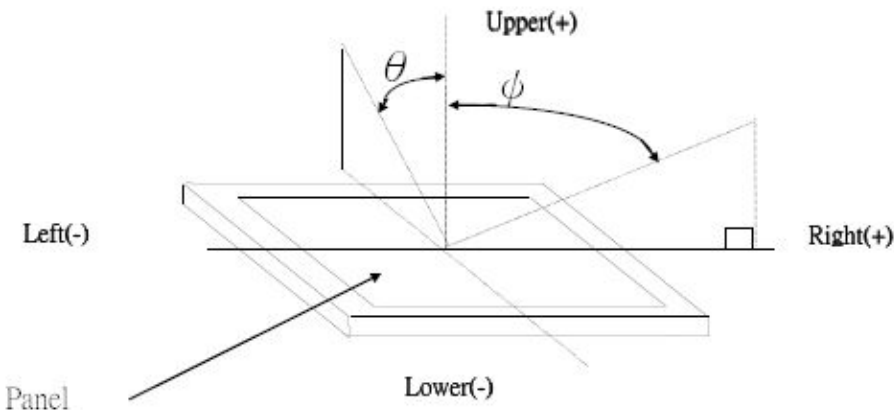
Note 6. Light source: C light.

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Standing Stock	Long Availability	NO MOQ	In Full Range

5. Electrical Characteristics

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

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	-0.3	4.6	**V**
Digital interface supple Voltage	VDDIO	-0.3	4.6	**V**
Operating temperature	T_{OP}	−20	+70	℃
Storage temperature	T_{ST}	−30	+80	℃

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	2.6	3..3	4.2	V	
Digital interface supple Voltage	VDDIO	1.65	3.3	4.2	V	
Normal mode Current consumption	IDD	--	10	--	mA	
Level input voltage	V_{IH}	0.7VDDIO		VDDIO	V	
	V_{IL}	GND		0.3VDDIO	V	
Level output voltage	V_{OH}	0.8VDDIO		VDDIO	V	
	V_{OL}	GND		0.2VDDIO	V	

5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 4 chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	60	80	--	mA	
Forward Voltage	V_F	--	3.2	--	V	
LCM Luminance	LV	320	——	--	cd/m2	IF=80mA
LED life time	Hr	50000	--	--	Hour	Note1,2
Uniformity	AVg	80	--	--	%	

Note (1)   LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

Ta=25±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

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Note (2)　　The "LED life time" is defined as the module brightness decrease to 50% original brightness at

Ta=25℃ and IL=80mA. The LED lifetime could be decreased if operating IL is larger than 80mA. The

constant current driving method is suggested.

K1(－)　　　　　　　　　　　　　
K2(－)　　　　　　　　　　A(＋)
K3(－)
K4(－)

BLU CIRCUIT DIAGRAM
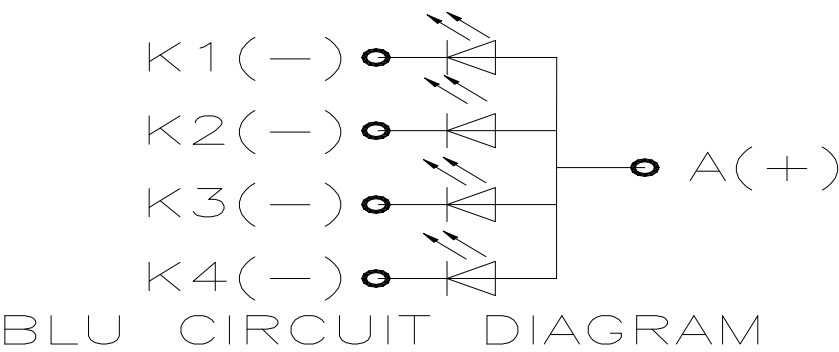
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6. AC Characteristic

6.1 DBI Type B (18/16/9/8 bit) Interface Timing Characteristics
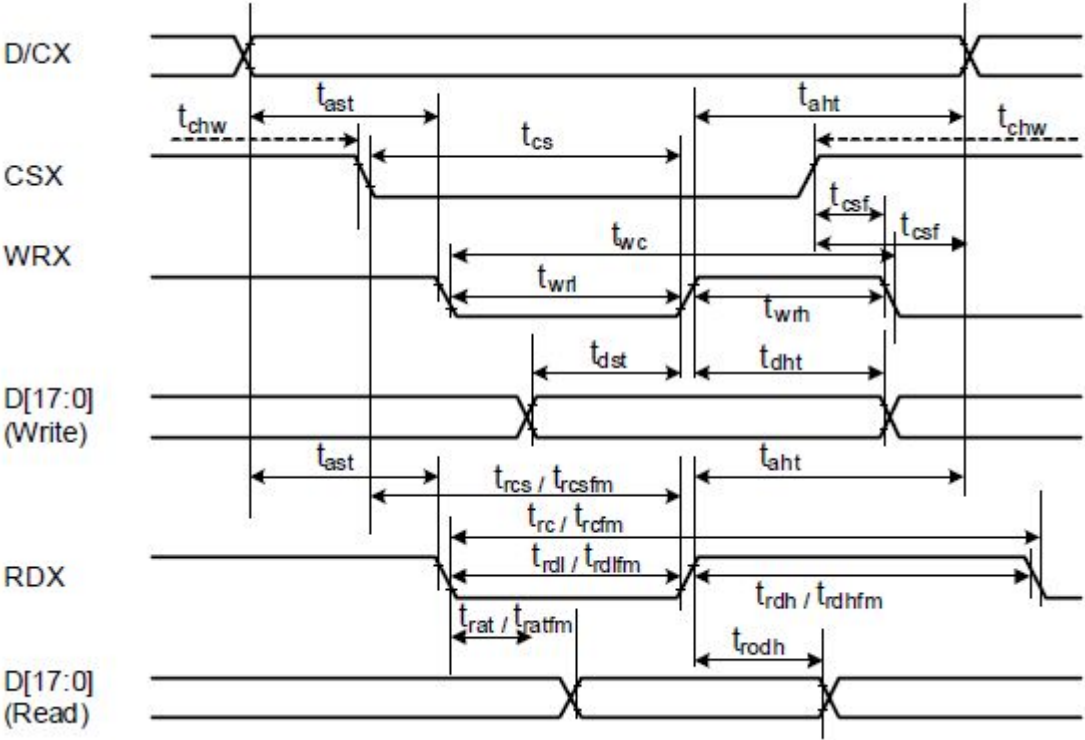
Signal	Symbol	Parameter	min	max	Unit	Description
D/CX	tast	Address setup time	0	-	ns	
	taht	Address hold time (Write/Read)	10	-	ns	
CSX	tchw	CSX "H" Pulse Width	0	-	ns	
	tcs	Chip Select setup time (Write)	20	-	ns	
	trcs	Chip Select setup time (Read ID)	45	-	ns	
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write cycle	80	-	ns	
	twrh	Write Control pulse H duration	25	-	ns	
	twrl	Write Control pulse L duration	25	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	
	trdh	Read Control pulse H duration (ID)	90	-	ns	
	trdl	Read Control pulse L duration (ID)	45	-	ns	
RDX (FM)	trcfm	Read cycle (FM)	450	-	ns	
	trdhfm	Read Control pulse H duration (FM)	90	-	ns	
	trdlfm	Read Control pulse L duration (FM)	355	-	ns	
DB[17:0], DB[15:0], DB[8:0], DB[7:0]	tdst	Data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tdht	Data hold time	10	-	ns	
	trat	Read access time (ID)	-	40	ns	
	tratfm	Read access time (FM)	-	340	ns	
	todh	Output disable time	20	-	ns	

Note: Ta = -30 to 70 °C, VDDI=1.65V to 3.3V, VDD=2.5V to 3.0V, DGND=0V
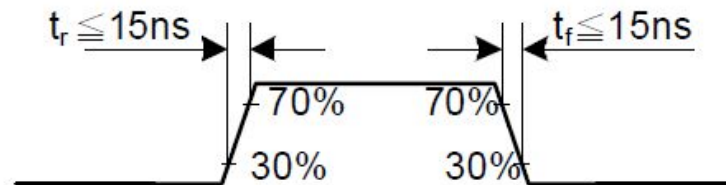
CSX timings:

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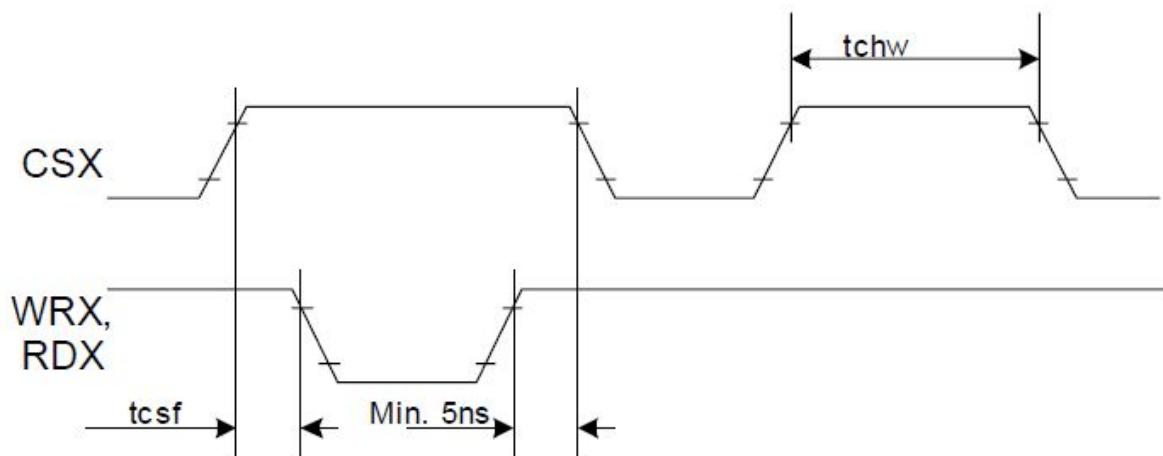
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

Write to read or read to write timings:
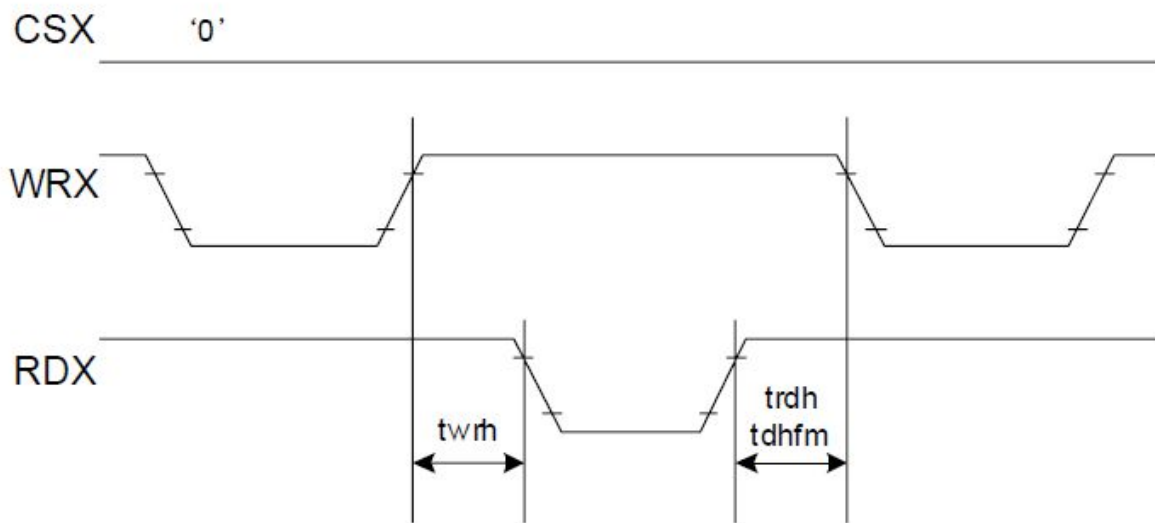
Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

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常 备 库 存	长 期 供 货	支持小量	品 种 齐 全
Standing Stock	Long Availability	NO MOQ	In Full Range

6.2 DBI Type C (SPI) Interface Timing Characteristics

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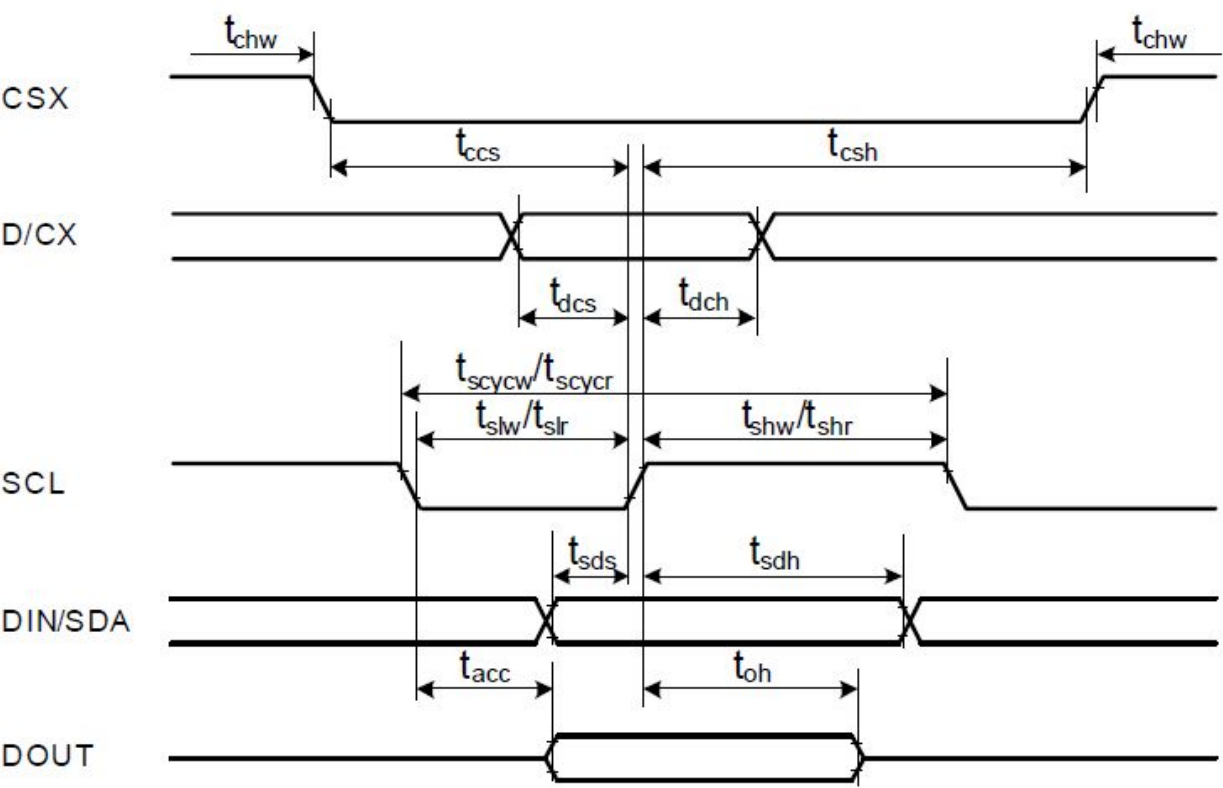
Signal	Symbol	Parameter	min	max	Unit	Description
CSX	tcss	CSX-SCL time (Write)	15	-	ns	
	tcsh	CSX-SCL time (Write)	15	-	ns	
	tcss	CSX-SCL time (Read)	60	-	ns	
	tcsh	CSX-SCL time (Read)	60	-	ns	
	tchw	CSX "H" pulse time	40	-	ns	
SCL	tscycw	Serial clock cycle (Write)	60	-	ns	
	tshw	SCL "H" pulse width (Write)	15	-	ns	
	tslw	SCL "L" pulse width (Write)	15	-	ns	
	tscycr	Serial clock cycle (Read GRAM)	300	-	ns	
	tshr	SCL "H" pulse width (Read GRAM)	110	-	ns	
	tslr	SCL "L" pulse width (Read GRAM)	110	-	ns	
	tscycr	Serial clock cycle (Read ID)	150	-	ns	
	tshr	SCL "H" pulse width (Read GRAM)	54	-	ns	
	tslr	SCL "L" pulse width (Read GRAM)	54	-	ns	
D/CX	tdcs	D/CX setup time	7	-	ns	
	tdch	D/CX hold time	7	-	ns	
SDA (Input) (Output)	tacc	Access time	10	50	ns	For maximum CL=30pF For minimum CL=8pF
	toh	Output disable time	15	50	ns	
	tsds	Data setup time	7	-		
	tsdh	Data hold time	7	-		

Note: Ta = -30 to 70 °C, VDDI=1.65V to 3.3V, VDD=2.5V to 3.0V, AGND=DGND=0V

$t_r \leq 15ns$ $t_f \leq 15ns$

70%   70%

30%   30%

6.3 RGB Interface Timing Characteristics
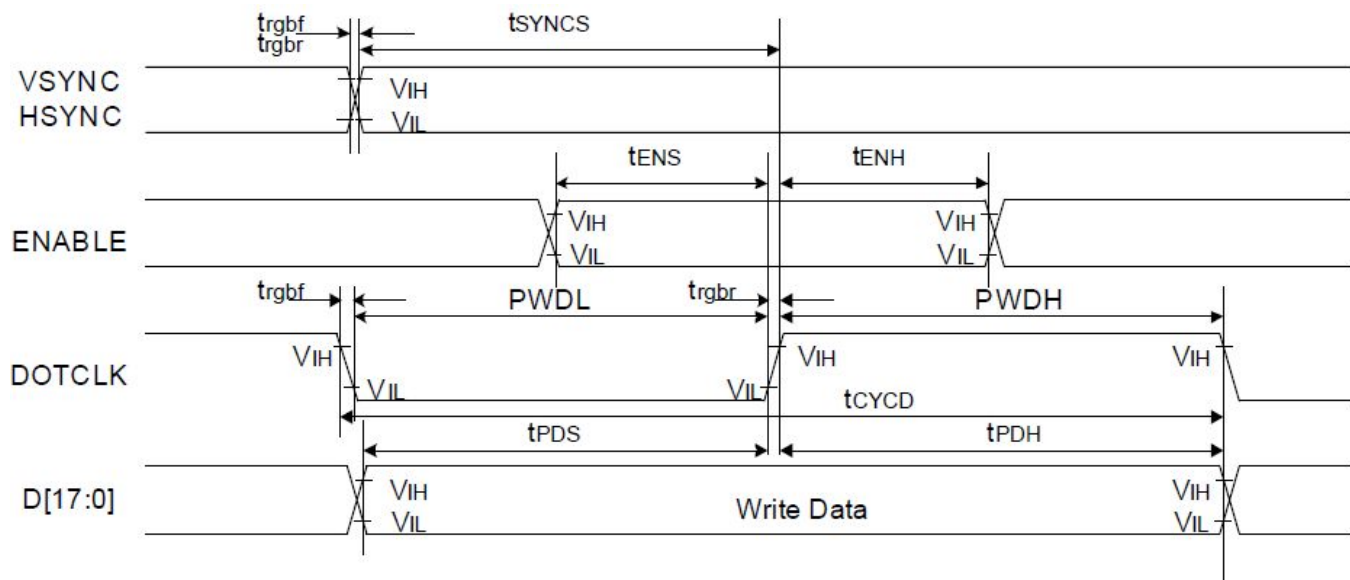
Signal	Symbol	Parameter	min	max	Unit	Description
VSYNC / HSYNC	t_{SYNCS}	VSYNC/HSYNC setup time	15	-	ns	18/16-bit bus RGB interface mode
	t_{SYNCH}	VSYNC/HSYNC hold time	15	-	ns	
ENABLE	t_{ENS}	ENABLE setup time	15	-	ns	
	t_{ENH}	ENABLE hold time	15	-	ns	
D[17:0]	t_{POS}	Data setup time	15	-	ns	
	t_{PDH}	Data hold time	15	-	ns	
DOTCLK	PWDH	DOTCLK high-level period	15	-	ns	
	PWDL	DOTCLK low-level period	15	-	ns	
	t_{CYCD}	DOTCLK cycle time	100	-	ns	
	t_{rgbr}, t_{rgbf}	DOTCLK,HSYNC,VSYNC rise/fall time	-	15	ns	
VSYNC / HSYNC	t_{SYNCS}	VSYNC/HSYNC setup time	15	-	ns	6-bit bus RGB interface mode
	t_{SYNCH}	VSYNC/HSYNC hold time	15	-	ns	
ENABLE	t_{ENS}	ENABLE setup time	15	-	ns	
	t_{ENH}	ENABLE hold time	15	-	ns	
D[17:0]	t_{POS}	Data setup time	15	-	ns	
	t_{PDH}	Data hold time	15	-	ns	
DOTCLK	PWDH	DOTCLK high-level pulse period	15	-	ns	
	PWDL	DOTCLK low-level pulse period	15	-	ns	
	t_{CYCD}	DOTCLK cycle time	100	-	ns	
	t_{rgbr}, t_{rgbf}	DOTCLK,HSYNC,VSYNC rise/fall time	-	15	ns	

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Standing Stock　　　Long Availability　　NO MOQ　　　In Full Range

7. LCD Module Out-Going Quality Level

7.1 VISUAL & FUNCTION INSPECTION STANDARD

7.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

Temperature: 25±5℃

Humidity: 65%±10%RH

Viewing Angle: Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance: 30-50cm
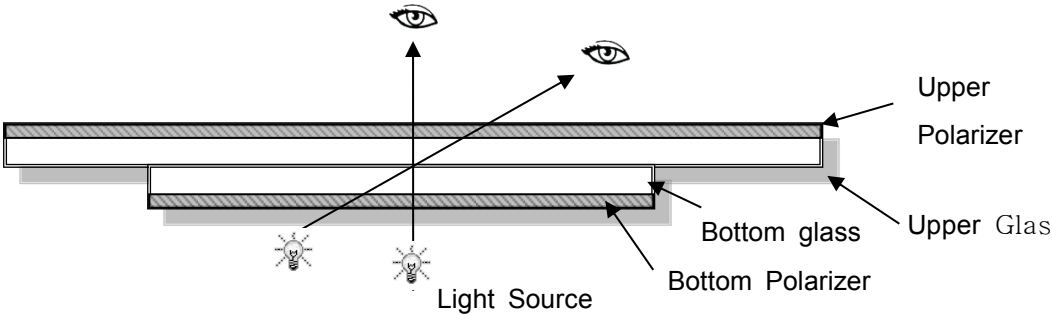
7.1.2 Definition
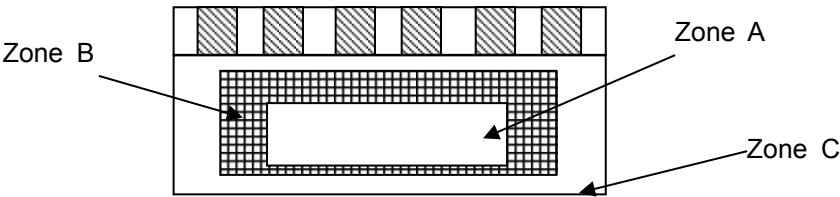
Zone A: Effective Viewing Area (Character or Digit can be seen).

Zone B: Viewing Area except Zone A.

Zone C: Outside (Zone A +Zone B) which can't be seen after assembly by customer.

Note:

As a general rule, visual defects in Zone C can be ignored when it doesn't effecting product function or appearance after assembly by customer.

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7.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class Ⅱ

AQL:
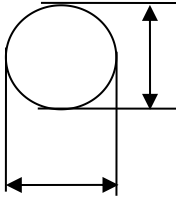
Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display, TP: Touch Panel, LCM: Liquid Crystal Module

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
s2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

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常 备 库 存	长 期 供 货	支持小量	品 种 齐 全
Standing Stock	Long Availability	NO MOQ	In Full Range

7.1.4 Criteria (Visual)

Number	Items	Criteria(mm)
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L:Length of ITO T:Height of LCD	(1) The edge of LCD broken	(see diagram) | X	Y	Z | |---|---|---| | ≤3.0mm | <Inner border line of the seal | ≤T |
	(2)LCD corner broken	(see diagram) | X	Y	Z | |---|---|---| | ≤3.0mm | ≤L | ≤T |
	(3) LCD crack	Crack Not allowed

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Standing Stock　　　Long Availability　　　NO MOQ　　　In Full Range

Number	Items	Criteria (mm)
2.0	Spot defect Y X Φ=(X+Y)/2	① light dot（LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain） ② Dim spot（LCD/TP/Polarizer dim dot, light leakage、dark spot） ③ Polarizer accidented spot

① light dot（LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain）

Size (mm) / Zone	Acceptable Quality		
	A	B	C
Φ≤0.10	Ignore		
0.10<Φ≤0.25	3(distance≧10mm)		Ignor
0.25<Φ≤0.40	2		
Φ＞0.40	0		

② Dim spot（LCD/TP/Polarizer dim dot, light leakage、dark spot）

Size (mm) / Zone	Acceptable Quality		
	A	B	C
Φ≤0.1	Ignore		
0.10<Φ≤0.25	3(distance≧10mm)		Ignore
0.25<Φ≤0.40	2		
Φ＞0.40	0		

③ Polarizer accidented spot

Size (mm) / Zone	Acceptable Quality		
	A	B	C
Φ≤0.2	Ignore		
0.2<Φ≤0.5	2(distance≧10mm)		Ignore
Φ>0.5	0		

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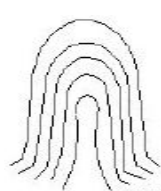| 常 备 库 存	长 期 供 货	支持小量	品 种 齐 全
Standing Stock	Long Availability	NO MOQ	In Full Range

Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	Width(mm)	Length(mm	Acceptable Quality		
			A	B	C
	Φ≤0.03	Ignore	Ignore		Ignore
	0.03<W≤0.05	L≤3.0	N≤2		
	0.05<W≤0.08	L≤2.0	N≤2		
	0.08<W	Define as spot defect			

3.0	Polarizer Bubble	Size (mm) / Zone	Acceptable Qty		
			A	B	C
		Φ≤0.2	Ignore		Ignore
		0.2<Φ≤0.4	3(distance≧10		
		0.4<Φ≤0.6	2		
		0.6<Φ	0		

4.0	SMT	According to IPC-A-610C class Ⅱ standard . Function defect and missing part are major defect ,the others are minor defect.

5.0	TP Related	TP bubble/ accidented spot	Size Φ(mm)	Acceptable Qty		
				A	B	C
			Φ≤0.1	Ignore		Ignore
			0.1<Φ≤0.25	3 (distance≧10m		
			0.25<Φ≤0.3	2		
			0.3<Φ	0		
		Assembly deflection	beyond the edge of backlight ≤0.15mm			

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常 备 库 存 Standing Stock　　长 期 供 货 Long Availability　　支持小量 NO MOQ　　品 种 齐 全 In Full Range

	Newton Ring	Newton Ring area>1/3 TP area NG Newton Ring area≤1/3 TP area OK	
	TP corner broken X：length Y：width Z：height		
	TP edge broken X：length Y：width Z：height		

TP corner broken:

X	Y	Z
X≤3.0mm	Y≤3.0mm	Z<LCD thickness

* Circuitry broken is not allowed.

TP edge broken:

X	Y	Z
X≤6.0mm	Y≤2.0mm	Z<LCD thickness

* Circuitry broken is not allowed.

<u>Criteria (functional items)</u>

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

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8. Reliability Test Result

8.1 Condition

Item	Condition	Sample Size	Test Result	Note
Low Temperature Operating Life test	-20℃, 96HR	3ea	pass	-
Thermal Humidity Operating Life test	70℃90%RH, 96HR	3ea	pass	-
Temperature Cycle ON/OFF test	-20℃ ↔ 70℃, ON/OFF, 20CYC	3ea	pass	(1)
High Temperature Storage test	80℃, 96HR	3ea	pass	-
Low Temperature Storage test	−30℃, 96HR	3ea	pass	-
ESD test	150pF, 330Ω , ±6KV(Contact)/± 8KV(Air), 5 points/panel, 10 times/point	3ea	pass	
Thermal Shock Resistance	The sample should be allowed to stand the following 5 cycles of operation: TSTL for 30 minutes -> normal temperature for 5 minutes -> TSTH for 30 minutes -> normal temperature for 5 minutes, as one cycle, then taking it out and drying it at normal temperature, and allowing it stand for 24 hours	3ea	pass	
sBox Drop Test	1 Corner 3 Edges 6 faces, 66㎝(MEDIUM BOX)	1box	pass	-

Note (1) ON Time over 10 seconds, OFF Time under 10 seconds

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Standing Stock　　Long Availability　　NO MOQ　　In Full Range

9. Cautions and Handling Precautions

9.1 Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.

Do not warp or twist the module during assembly work.

(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

(4) Do not allow drops of water or chemicals to remain on the display surface.

If you have the droplets for a long time, staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.

Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static; it may cause damage to the CMOS ICs.

(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(10) Do not disassemble the module.

(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Do not connect, disconnect the module in the "Power ON" condition.

(14) Power supply should always be turned on/off by the item 6.1 Power On Sequence &6.2 Power Off Sequence

9.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.

It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%

(2) Do not store the TFT-LCD module in direct sunlight.

(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.

(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.

In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

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10.Packing

---TBD----

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