天津正显科技有限公司

Tianjin Right Display Technology Co., Ltd.

SPECIFICATION

Customer: _____

Model Name: ZXT20007AA0

SPEC NO.: _____

Date: _____

Version: _____

√ **Preliminary Specification**

□ **Final Specification**

For Customer's Acceptance

Approved by	Comment

公司地址：天津市武清区京滨工业园京滨睿城 A6 楼　　邮编：301712
COMPANY ADDRESS：
A6 Building, Jing Bin Rui Cheng, Jingbin Industrial Park, Wuqing District, Tianjin City, China.　　P.C：301712
电话: +86-22-59678116　　传真: +86-22-59678116

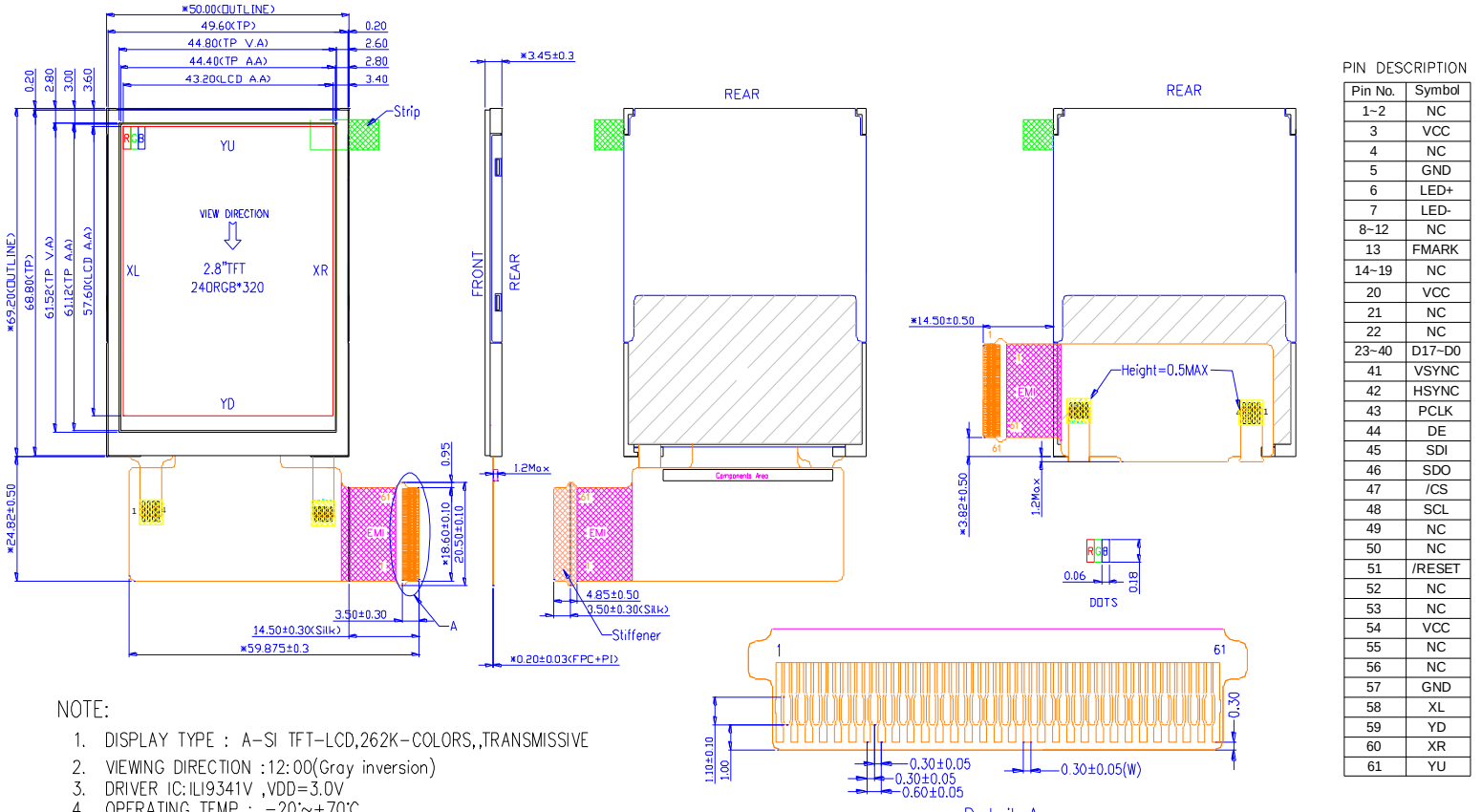
Revision History

Date	Rev.	Page	Description
2019-6-15	1.0	ALL	First issue

CONTENT

1. LCM DRAWING
2. GENERAL DESCRIPTION
3. ELECTRO-OPTICAL CHARACTERISTICS
4. BLOCK DIAGRAM
5. PINS DESCRIPTION
6. ELECTRONIC CHARACTERISTICS
7. INSTRUCTION DESCRIPTION
8. TOUCH PANEL CHARACTERISTICS
9. PRODUCT QUALITY & RELIABILITY
10. PRECAUTIONS IN USING
11. APPLICATION
12. CLASSIFICATION INFORMATION
13. HISTORY OF VERSION

1.LCM DRAWING



PIN DESCRIPTION

Pin No.	Symbol
1~2	NC
3	VCC
4	NC
5	GND
6	LED+
7	LED-
8~12	NC
13	FMARK
14~19	NC
20	VCC
21	NC
22	NC
23~40	D17~D0
41	VSYNC
42	HSYNC
43	PCLK
44	DE
45	SDI
46	SDO
47	/CS
48	SCL
49	NC
50	NC
51	/RESET
52	NC
53	NC
54	VCC
55	NC
56	NC
57	GND
58	XL
59	YD
60	XR
61	YU

NOTE:

1. DISPLAY TYPE : A-SI TFT-LCD,262K-COLORS,,TRANSMISSIVE
2. VIEWING DIRECTION :12:00(Gray inversion)
3. DRIVER IC:ILI9341V ,VDD=3.0V
4. OPERATING TEMP : -20°~+70°C
   STORAGE TEMP : -30°~+80°C
5. Interface : 3-wire 9-bit SPI+RGB LCD interface
6. BACK LIGHT:LED WHITE ,4 LED,IF=80mA,VF=3.2±0.5V
   LCM LUMINANCE:180cd/m²(Typ)

NO.	REVISION RECORD	DATE
1		

RoHS

	DRAWN	CHECK	APPROVE	PRODUCT NO.	ZXT20007AA0
NAME				PART NO.	ZXT20007AA0-LCM
DATE				CUSTOMER NO.	

TOLERANCES UNLESS SPECIFIED:±0.30	REV.	V0	UNIT	mm
	PAGE	1	SHEET	1/1

天津正显科技有限公司
Tianjin Right Display Technology Co., Ltd.

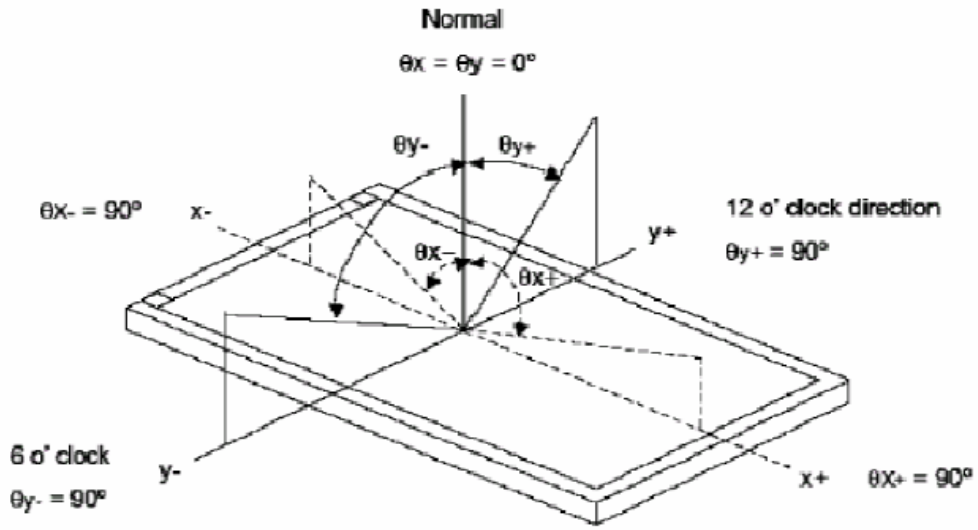
2. GENERAL DESCRIPTION

ITEM	CONTENT	UNIT
SCREEN SIZE	2.8”	
DISPLAY TYPE	A-SI TFT-LCD,262K-COLORS, TRANSMISSIVE	
VIEWING DIRECTION	12:00(Gray inversion)	O’CLOCK
CONTROLLER	ILI9341V	
OPEATING TEMPERATURE	-20~+70	℃
STORAGE TEMPERATURE	-30~+80	℃
BACKLIGHT TYPE	LED,WHITE	
INTERFACE TYPE	3-wire 9-bit SPIⅡ +RGB	
DISPLAY FORMAT	240RGB*320	DOTS
MODULE DIMENSION	50.00(w)*69.20 (h)*3.45(t)	mm
ACTIVE AREA	43.20(w)*57.60(h)	mm
PIXEL PITCH	0.18(w)*0.18(h)	mm

3. ELECTRO-OPTICAL CHARACTERISTICS

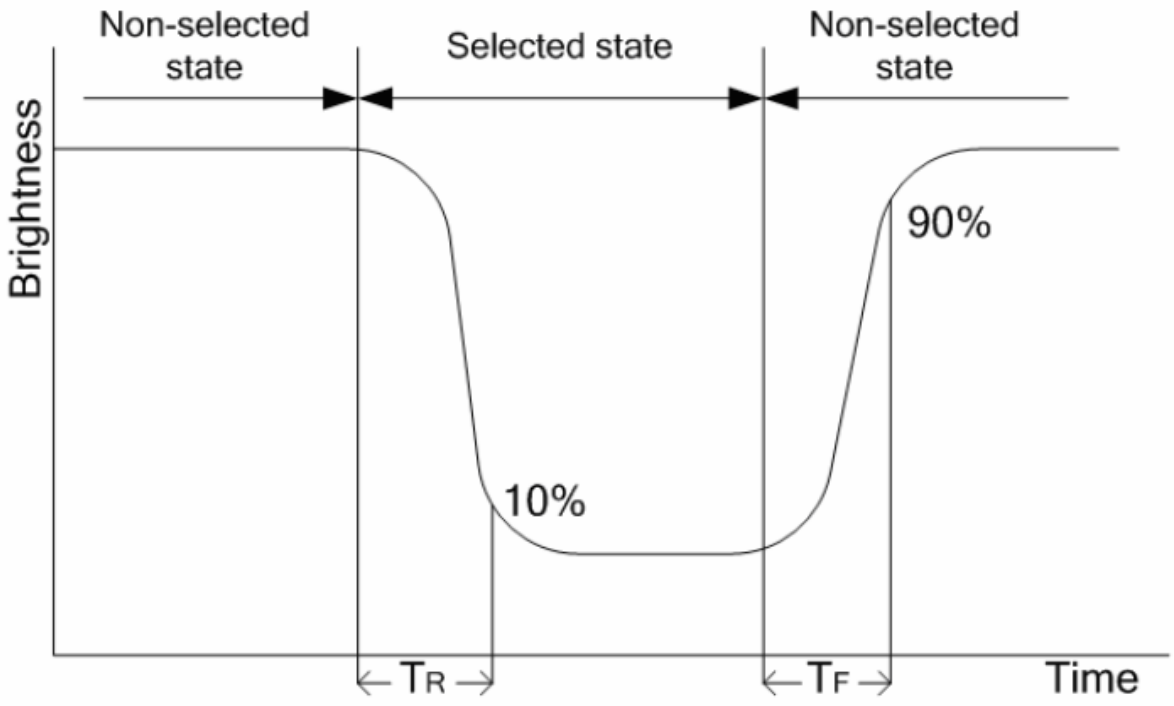
ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B	Viewing normal angle	150	180	-	Cd/m^2	
Contrast Ratio		CR		250	350	--	--	
Response Time		Tr+Tf		--	25	30	ms	
Chromaticity Coordinate (Transmissive)	Red	X		0.606	0.626	0.646		
		Y		0.305	0.325	0.345		
	Green	X		0.304	0.342	0.382		
		Y		0.516	0.561	0.601		
	Blue	X		0.105	0.145	0.185		
		Y		0.047	0.087	0.127		
	White	X		0.250	0.300	0.350		
		Y		0.270	0.320	0.370		
Viewing Angle	Hor.	θ_{x+}	Center CR>=10	45	65	--	Deg.	
		θ_{x-}		45	65	--		
	Ver.	θ_{y+}		35	50	--		
		θ_{y-}		45	65			
Uniformity	Un			80	--		%	

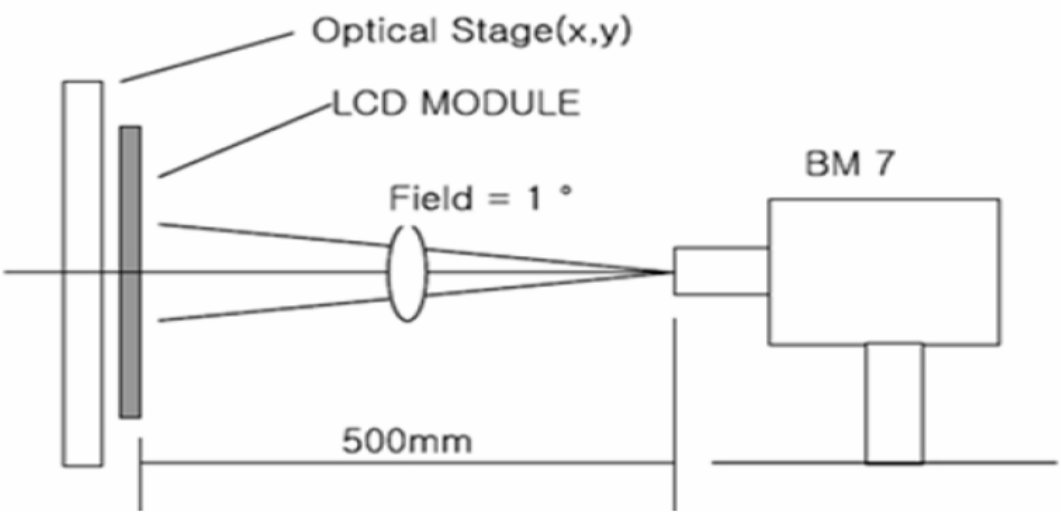
Note 1 : Definition of Viewing Angleθ_x andθ_y :



2: Definition of contrast ratio CR:

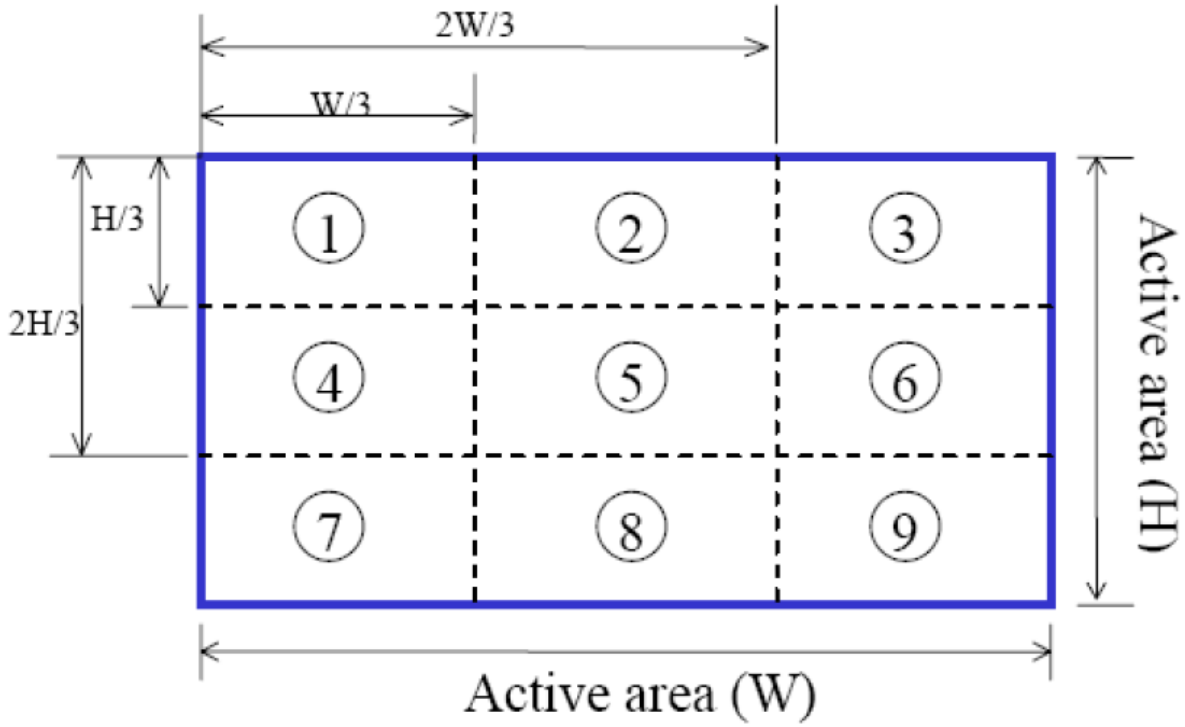
$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$





<Transmissive Mode>

Optical Characteristic Measurement Equipment and method



Main Measuring poin

4.BLOCK DIAGRAM

NO

5. PINS DESCRIPTION

Pin No.	Symbol	Description
1~2	NC	No connect
3	VCC	Power supply
4	NC	No connect
5	GND	Power ground
6	LED+	Backlight LED anode
7	LED-	Backlight LED cathode
8~12	NC	No connect
13	FMARK	Tearing effect output pin
14~19	NC	No connect
20	VCC	Power supply
21	NC	No connect
22	NC	No connect
23~40	D17~D0	Data Bus
41	VSYNC	Vertical synchronous signal
42	HSYNC	Horizontal synchronous signal
43	PCLK	Dot clock signal
44	DE	Data ENEABLE signal
45	SDI	SPI interface input pin
46	SDO	SPI interface output pin
47	/CS	L:Chip Selected H:Chip Unselected
48	SCL	clock signal
49	NC	No connect
50	NC	No connect
51	/RESET	L: initialization is executed
52	NC	No connect
53	NC	No connect
54	VCC	Power supply
55	NC	No connect
56	NC	No connect
57	GND	Power ground
58	XL	Touch screen X corrdinate left
59	YD	Touch screen Y corrdinate down
60	XR	Touch screen X corrdinate right
61	YU	Touch screen Y corrdinate up

6.ELECTRONIC CHARACTERISTICS

6.1 MAXIMUM VALUES

Item	Symbol	Unit	Value
Supply voltage	VCI	V	-0.3 ~ +4.6
Supply voltage (Logic)	VDDI	V	-0.3 ~ +4.6
Supply voltage (Digital)	VCORE	V	-0.3 ~ +2.0
Driver supply voltage	VGH-VGL	V	-0.3 ~ +32.0
Logic input voltage range	VIN	V	-0.3 ~ VDDI + 0.3
Logic output voltage range	VO	V	-0.3 ~ VDDI + 0.3
Operating temperature	Topr	℃	-20~70
Storage temperature	Tstg	℃	-30~80
Note: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.			

6.2. DC CHARACTERISTICS

Item	Symbol	Unit	Condition	Min.	Typ.	Max.	Note
Power and Operation Voltage							
Analog Operating Voltage	VCI	V	Operating voltage	2.5	2.8	3.3	Note2
Logic Operating Voltage	VDDI	V	I/O supply voltage	1.65	2.8	3.3	Note2
Digital Operating voltage	VCORE	V	Digital supply voltage	-	1.5	-	Note2
Gate Driver High Voltage	VGH	V	-	12.0	-	21.0	Note3
Gate Driver Low Voltage	VGL	V	-	-12.5	-	-7.0	Note3
Driver Supply Voltage	-	V	|VGH-VGL|	-	-	32	Note3
Input and Output							
Logic High Level Input Voltage	VIH	V	-	0.7*VDDI	-	VDDI	Note1,2,3
Logic Low Level Input Voltage	VIL	V	-	VSS	-	0.3*VDDI	Note1,2,3
Logic High Level Output Voltage	VOH	V	IOL=-1.0mA	0.8*VDDI	-	VDDI	Note1,2,3
Logic Low Level Output Voltage	VOL	V	IOL=1.0mA	VSS	-	0.2*VDDI	Note1,2,3
Logic High Level Input Current	IIH	uA	-	-	-	1	Note1,2,3
Logic Low Level input Current	IIL	uA	-	-1	-	-	Note1,2,3
Logic Input Leakage Current	ILEA	uA	VIN=VDDI or VSS	-0.1	-	+0.1	Note1,2,3
VCOM Operation							
VCOM High Voltage	VCOMH	V	Ccom=12nF	2.5	-	5.0	Note3
VCOM Low Voltage	VCOML	V	Ccom=12nF	-2.5	-	0.0	Note3
VCOM Amplitude Voltage	VCOMA	V	|VCOMH-VCOML|	4.0	-	5.5	Note3
Source Driver							
Source Output Range	Vsout	V	-	0.1	-	AVDD-0.1	Note4
Gamma Reference Voltage	GVDD	V	-	3.0	-	5.0	Note3
Output Deviation Voltage (Source Output channel)	Vdev	mV	Sout>=4.5V Sout<=0.5V	-	-	120	Note4
			4.5V>Sout>0.5V	-	-	50	-
Output Offset Voltage	VOFSET	mV	-	-	-	35	Note7
Booster Operation							
1st Booster (VCIx2) Voltage	AVDD	V	-	4.95 (Note 5)	-	5.5 (Note 6)	Note3
Liner Range	Vliner	V	-	0.2	-	AVDD-0.2	
Current consumption during sleep mode operation							
Sleep mode current	I_{STB}	μA	VCI=VDDI=2.8V T=25℃	-	-	50	-

Note 1: VDDI=1.65 to 3.3V, VCI=2.5 to 3.3V, AGND=VSS=0V, Ta=-30 to 70 (to +85 no damage) ℃.

Note2: Please supply digital VDDI voltage equal or less than analog VCI voltage.

Note3: CSX, RDX, WRX, D[17:0], D/CX, RESX, TE, DOTCLK, VSYNC, HSYNC, DE, SDA, SCL, IM3, IM2, IM1, IM0, and Test pins.

Note4: When the measurements are performed with LCD module. Measurement Points are like Note3.

Note5: VCI=2.6V

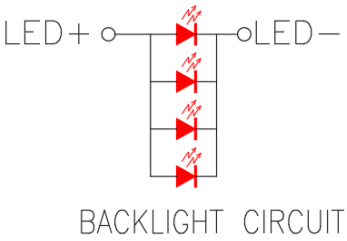
Note6: VCI=3.3V

Note7: The Max. Value is between with Note 4 measure point and Gamma setting value

6.3 ELECTRICAL/OPTLCAL CHARACTERISTICS

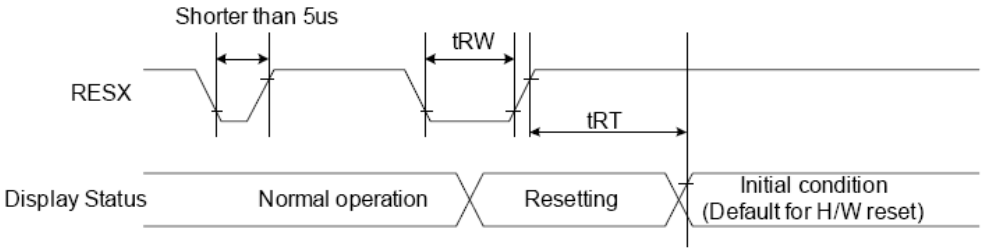
Ta=25℃,Unless specified, The Ambient temperature Ta=25℃

Item	Symbol	min	typ	max	Unit	Condition
Forward Voltage	Vf	2.7	3.2	3.7	V	If=80mA
Reverse Current(per led)	Ir		10		uA	Vr=5V
Luminance(LCM)	Lv		180		cd/㎡	If=80mA



6.4 TIMING CHARACTERISTICS

Reset Timing



Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5)	mS
				120 (note 1,6,7)	mS

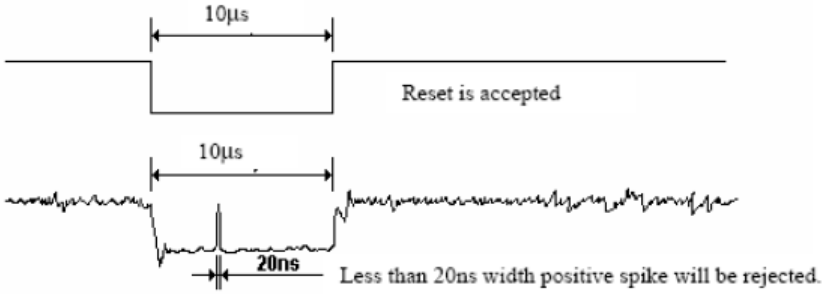
Note 1: The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NV memory to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

Note 2: 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 5us	Reset Rejected
Longer than 10us	Reset
Between 5us and 10us	Reset starts

Note 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.

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

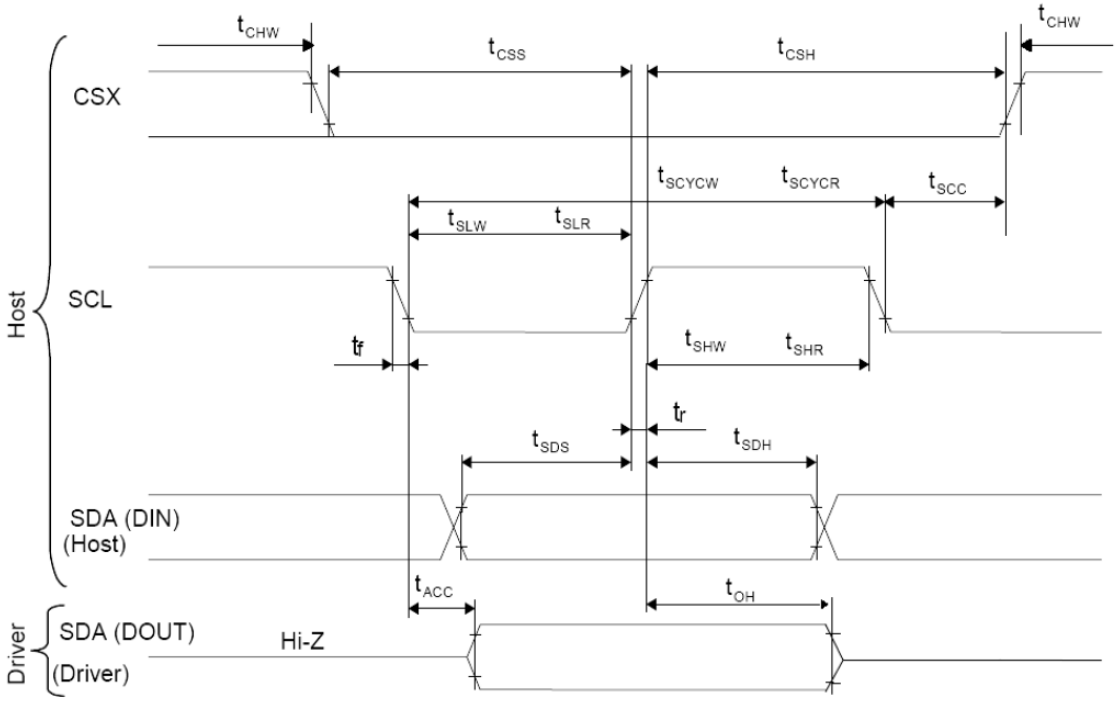


Note 5: When Reset applied during Sleep In Mode.

Note 6: When Reset applied during Sleep Out Mode.

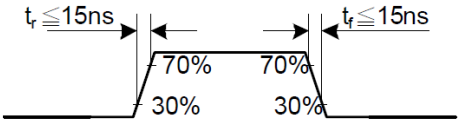
Note 7: It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

Display Serial Interface Timing Characteristics (3-line SPI system)

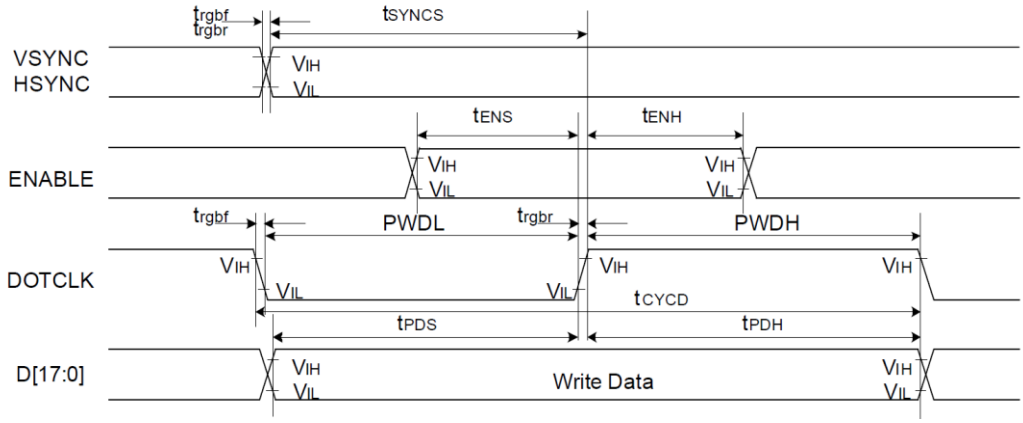


Signal	Symbol	Parameter	min	max	Unit	Description
SCL	tscycw	Serial Clock Cycle (Write)	100	-	ns	
	tshw	SCL “H” Pulse Width (Write)	40	-	ns	
	tslw	SCL “L” Pulse Width (Write)	40	-	ns	
	tscycr	Serial Clock Cycle (Read)	150	-	ns	
	tshr	SCL “H” Pulse Width (Read)	60	-	ns	
	tslr	SCL “L” Pulse Width (Read)	60	-	ns	
SDA / SDI (Input)	tsds	Data setup time (Write)	30	-	ns	
	tsdh	Data hold time (Write)	30	-	ns	
SDA / SDO (Output)	tacc	Access time (Read)	10	-	ns	
	toh	Output disable time (Read)	10	50	ns	
CSX	tscc	SCL-CSX	20	-	ns	
	tchw	CSX “H” Pulse Width	40	-	ns	
	tcss	CSX-SCL Time	60	-	ns	
	tcsh		65	-	ns	

Note: Ta = 25 °C, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, AGND=VSS=0V

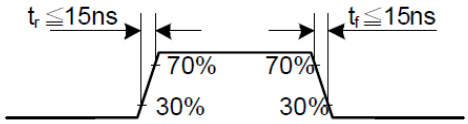


Parallel 18/16/6-bit RGB Interface Timing Characteristics



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	
DE	t_{ENS}	DE setup time	15	-	ns	
	t_{ENH}	DE 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	
DE	t_{ENS}	DE setup time	15	-	ns	
	t_{ENH}	DE 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	50	-	ns	
	t_{rgbr} , t_{rgbf}	DOTCLK,HSYNC,VSYNC rise/fall time	-	15	ns	

Note: Ta = -30 to 70 °C, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, AGND=VSS=0V



7. INSTRUCTION DESCRIPTION

Regulative Command Set													
Command Function	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	Hex
No Operation	0	1	↑	XX	0	0	0	0	0	0	0	0	00h
Software Reset	0	1	↑	XX	0	0	0	0	0	0	0	1	01h
Read Display Identification Information	0	1	↑	XX	0	0	0	0	0	1	0	0	04h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	ID1 [7:0]								XX
	1	↑	1	XX	ID2 [7:0]								XX
	1	↑	1	XX	ID3 [7:0]								XX
Read Display Status	0	1	↑	XX	0	0	0	0	1	0	0	1	09h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [31:25]							0	00
	1	↑	1	XX	0	D [22:20]			D [19:16]				61
	1	↑	1	XX	D [15]	0	D [13]	0	0	D [10:8]			00
	1	↑	1	XX	D [7:5]			D [4:1]				0	00
Read Display Power Mode	0	1	↑	XX	0	0	0	0	1	0	1	0	0Ah
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:2]						0	0	08
Read Display MADCTL	0	1	↑	XX	0	0	0	0	1	0	1	1	0Bh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:2]						0	0	00
Read Display Pixel Format	0	1	↑	XX	0	0	0	0	1	1	0	0	0Ch
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	DPI [2:0]		0	DBI [2:0]				06
Read Display Image Format	0	1	↑	XX	0	0	0	0	1	1	0	1	0Dh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	0	0	0	0	D [2:0]			00
Read Display Signal Mode	0	1	↑	XX	0	0	0	0	1	1	1	0	0Eh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:2]						0	0	00
Read Display Self-Diagnostic Result	0	1	↑	XX	0	0	0	0	1	1	1	1	0Fh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	D [7:6]		0	0	0	0	0	0	00
Enter Sleep Mode	0	1	↑	XX	0	0	0	1	0	0	0	0	10h
Sleep OUT	0	1	↑	XX	0	0	0	1	0	0	0	1	11h
Partial Mode ON	0	1	↑	XX	0	0	0	1	0	0	1	0	12h
Normal Display Mode ON	0	1	↑	XX	0	0	0	1	0	0	1	1	13h
Display Inversion OFF	0	1	↑	XX	0	0	1	0	0	0	0	0	20h
Display Inversion ON	0	1	↑	XX	0	0	1	0	0	0	0	1	21h
Gamma Set	0	1	↑	XX	0	0	1	0	0	1	1	0	26h
	1	1	↑	XX	GC [7:0]								01
Display OFF	0	1	↑	XX	0	0	1	0	1	0	0	0	28h
Display ON	0	1	↑	XX	0	0	1	0	1	0	0	1	29h
Column Address Set	0	1	↑	XX	0	0	1	0	1	0	1	0	2Ah
	1	1	↑	XX	SC [15:8]								XX
	1	1	↑	XX	SC [7:0]								XX
	1	1	↑	XX	EC [15:8]								XX
	1	1	↑	XX	EC [7:0]								XX
Page Address Set	0	1	↑	XX	0	0	1	0	1	0	1	1	2Bh
	1	1	↑	XX	SP [15:8]								XX
	1	1	↑	XX	SP [7:0]								XX
	1	1	↑	XX	EP [15:8]								XX
	1	1	↑	XX	EP [7:0]								XX

Memory Write	0	1	↑	XX	0	0	1	0	1	1	0	0	2Ch
	1	1	↑	D [17:0]									XX
Color SET	0	1	↑	XX	0	0	1	0	1	1	0	1	2Dh
	1	1	↑	XX	0	0	R00 [5:0]						XX
	1	1	↑	XX	0	0	Rnn [5:0]						XX
	1	1	↑	XX	0	0	R31 [5:0]						XX
	1	1	↑	XX	0	0	G00 [5:0]						XX
	1	1	↑	XX	0	0	Gnn [5:0]						XX
	1	1	↑	XX	0	0	G64 [5:0]						XX
	1	1	↑	XX	0	0	B00 [5:0]						XX
	1	1	↑	XX	0	0	Bnn [5:0]						XX
	1	1	↑	XX	0	0	B31 [5:0]						XX
Memory Read	0	1	↑	XX	0	0	1	0	1	1	1	0	2Eh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	D [17:0]									XX
Partial Area	0	1	↑	XX	0	0	1	1	0	0	0	0	30h
	1	1	↑	XX	SR [15:8]								00
	1	1	↑	XX	SR [7:0]								00
	1	1	↑	XX	ER [15:8]								01
	1	1	↑	XX	ER [7:0]								3F
Vertical Scrolling Definition	0	1	↑	XX	0	0	1	1	0	0	1	1	33h
	1	1	↑	XX	TFA [15:8]								00
	1	1	↑	XX	TFA [7:0]								00
	1	1	↑	XX	VSA [15:8]								01
	1	1	↑	XX	VSA [7:0]								40
	1	1	↑	XX	BFA [15:8]								00
	1	1	↑	XX	BFA [7:0]								00
Tearing Effect Line OFF	0	1	↑	XX	0	0	1	1	0	1	0	0	34h
Tearing Effect Line ON	0	1	↑	XX	0	0	1	1	0	1	0	1	35h
	1	1	↑	XX	0	0	0	0	0	0	0	M	00
Memory Access Control	0	1	↑	XX	0	0	1	1	0	1	1	0	36h
	1	1	↑	XX	MY	MX	MV	ML	BGR	MH	0	0	00
Vertical Scrolling Start Address	0	1	↑	XX	0	0	1	1	0	1	1	1	37h
	1	1	↑	XX	VSP [15:8]								00
	1	1	↑	XX	VSP [7:0]								00
Idle Mode OFF	0	1	↑	XX	0	0	1	1	1	0	0	0	38h
Idle Mode ON	0	1	↑	XX	0	0	1	1	1	0	0	1	39h
Pixel Format Set	0	1	↑	XX	0	0	1	1	1	0	1	0	3Ah
	1	1	↑	XX	0	DPI [2:0]			0	DBI [2:0]			66
Write Memory Continue	0	1	↑	XX	0	0	1	1	1	1	0	0	3Ch
	1	1	↑	D [17:0]									XX
Read Memory Continue	0	1	↑	XX	0	0	1	1	1	1	1	0	3Eh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	D [17:0]									XX
Set Tear Scanline	0	1	↑	XX	0	1	0	0	0	1	0	0	44h
	1	1	↑	XX	0	0	0	0	0	0	0	STS [8]	XX
	1	1	↑	XX	STS [7:0]								XX
Get Scanline	0	1	↑	XX	0	1	0	0	0	1	0	1	45h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	0	0	0	0	0	GTS [9:8]		XX
	1	↑	1	XX	GTS [7:0]								XX
Write Display Brightness	0	1	↑	XX	0	1	0	1	0	0	0	1	51h
	1	1	↑	XX	DBV [7:0]								00

Read Display Brightness	0	1	↑	XX	0	1	0	1	0	0	1	0	52h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	DBV [7:0]								00
Write CTRL Display	0	1	↑	XX	0	1	0	1	0	0	1	1	53h
	1	1	↑	XX	0	0	BCTRL	0	DD	BL	0	0	00
Read CTRL Display	0	1	↑	XX	0	1	0	1	0	1	0	0	54h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	0	BCTRL	0	DD	BL	0	0	00
Write Content Adaptive Brightness Control	0	1	↑	XX	0	1	0	1	0	1	0	1	55h
	1	1	↑	XX	0	0	0	0	0	0	C [1:0]		00
Read Content Adaptive Brightness Control	0	1	↑	XX	0	1	0	1	0	1	1	0	56h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	0	0	0	0	0	C [1:0]		00
Write CABC Minimum Brightness	0	1	↑	XX	0	1	0	1	1	1	1	0	5Eh
	1	1	↑	XX	CMB [7:0]								00
Read CABC Minimum Brightness	0	1	↑	XX	0	1	0	1	1	1	1	1	5Fh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	CMB [7:0]								00
Read ID1	0	1	↑	XX	1	1	0	1	1	0	1	0	DAh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	Module's Manufacture [7:0]								XX
Read ID2	0	1	↑	XX	1	1	0	1	1	0	1	1	DBh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	LCD Module / Driver Version [7:0]								XX
Read ID3	0	1	↑	XX	1	1	0	1	1	1	0	0	DCh
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	LCD Module / Driver ID [7:0]								XX

Extended Command Set													
Command Function	D/CX	RDX	WRX	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	Hex
RGB Interface Signal Control	0	1	↑	XX	1	0	1	1	0	0	0	0	B0h
	1	1	↑	XX	ByPass_MODE	RCM [1:0]		0	VSPL	HSPL	DPL	EPL	00
Frame Control (In Normal Mode)	0	1	↑	XX	1	0	1	1	0	0	0	1	B1h
	1	1	↑	XX	0	0	0	0	0	0	DIVA [1:0]		00
	1	1	↑	XX	0	0	0	RTNA [4:0]					1B
Frame Control (In Idle Mode)	0	1	↑	XX	1	0	1	1	0	0	1	0	B2h
	1	1	↑	XX	0	0	0	0	0	0	DIVB [1:0]		00
	1	1	↑	XX	0	0	0	RTNB [4:0]					1B
Frame Control (In Partial Mode)	0	1	↑	XX	1	0	1	1	0	0	1	1	B3h
	1	1	↑	XX	0	0	0	0	0	0	DIVC [1:0]		00
	1	1	↑	XX	0	0	0	RTNC [4:0]					1B
Display Inversion Control	0	1	↑	XX	1	0	1	1	0	1	0	0	B4h
	1	1	↑	XX	0	0	0	0	0	NLA	NLB	NLC	02
Blanking Porch Control	0	1	↑	XX	1	0	1	1	0	1	0	1	B5h
	1	1	↑	XX	0	VFP [6:0]							02
	1	1	↑	XX	0	VBP [6:0]							02
	1	1	↑	XX	0	0	0	HFP [4:0]					0A
	1	1	↑	XX	0	0	0	HBP [4:0]					14

Display Function Control	0	1	↑	XX	1	0	1	1	0	1	1	0	B6h
	1	1	↑	XX	0	0	0	0	PTG [1:0]		PT [1:0]		0A
	1	1	↑	XX	REV	GS	SS	SM	ISC [3:0]				82
	1	1	↑	XX	0	0	NL [5:0]						27
	1	1	↑	XX	0	0	PCDIV [5:0]						04
Entry Mode Set	0	1	↑	XX	1	0	1	1	0	1	1	1	B7h
	1	1	↑	XX	0	0	0	0	0	GON	DTE	GAS	06
Backlight Control 1	0	1	↑	XX	1	0	1	1	1	0	0	0	B8h
	1	1	↑	XX	0	0	0	0	TH_UI [3:0]				0C
Backlight Control 2	0	1	↑	XX	1	0	1	1	1	0	0	1	B9h
	1	1	↑	XX	TH_MV [3:0]				TH_ST [3:0]				CC
Backlight Control 3	0	1	↑	XX	1	0	1	1	1	0	1	0	BAh
	1	1	↑	XX	0	0	0	0	DTH_UI [3:0]				04
Backlight Control 4	0	1	↑	XX	1	0	1	1	1	0	1	1	BBh
	1	1	↑	XX	DTH_MV [3:0]				DTH_ST [3:0]				65
Backlight Control 5	0	1	↑	XX	1	0	1	1	1	1	0	0	BCh
	1	1	↑	XX	DIM2 [3:0]				0	DIM1 [2:0]			44
Backlight Control 7	0	1	↑	XX	1	0	1	1	1	1	1	0	BEh
	1	1	↑	XX	PWM_DIV [7:0]								0F
Backlight Control 8	0	1	↑	XX	1	0	1	1	1	1	1	1	BFh
	1	1	↑	XX	0	0	0	0	0	LEDONR	LEDONPOL	LEDPWMOPL	00
Power Control 1	0	1	↑	XX	1	1	0	0	0	0	0	0	C0h
	1	1	↑	XX	0	0	VRH [5:0]						21
Power Control 2	0	1	↑	XX	1	1	0	0	0	0	0	1	C1h
	1	1	↑	XX	0	0	0	1	0	BT [2:0]			10
VCOM Control 1	0	1	↑	XX	1	1	0	0	0	1	0	1	C5h
	1	1	↑	XX	0	VMH [6:0]							31
	1	1	↑	XX	0	VML [6:0]							3C
VCOM Control 2	0	1	↑	XX	1	1	0	0	0	1	1	1	C7h
	1	1	↑	XX	nVM	VMF [6:0]							C0
NV Memory Write	0	1	↑	XX	1	1	0	1	0	0	0	0	D0h
	1	1	↑	XX	0	0	0	0	0	PGM_ADR [2:0]			00
	1	1	↑	XX	PGM_DATA [7:0]								XX
NV Memory Protection Key	0	1	↑	XX	1	1	0	1	0	0	0	1	D1h
	1	1	↑	XX	KEY [23:16]								XX
	1	1	↑	XX	KEY [15:8]								XX
	1	1	↑	XX	KEY [7:0]								XX
NV Memory Status Read	0	1	↑	XX	1	1	0	1	0	0	1	0	D2h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	ID2_CNT [2:0]			0	ID1_CNT [2:0]			XX
	1	↑	1	XX	BUSY	VMF_CNT [2:0]			0	ID3_CNT [2:0]			XX

Read ID4	0	1	↑	XX	1	1	0	1	0	0	1	1	D3h
	1	↑	1	XX	X	X	X	X	X	X	X	X	XX
	1	↑	1	XX	0	0	0	0	0	0	0	0	00
	1	↑	1	XX	1	0	0	1	0	0	1	1	93
	1	↑	1	XX	0	1	0	0	0	0	0	1	41
Positive Gamma Correction	0	1	↑	XX	1	1	1	0	0	0	0	0	E0h
	1	1	↑	XX	0	0	0	0	VP0 [3:0]				0F
	1	1	↑	XX	0	0	VP1 [5:0]						16
	1	1	↑	XX	0	0	VP2 [5:0]						14
	1	1	↑	XX	0	0	0	0	VP4 [3:0]				0A
	1	1	↑	XX	0	0	0	VP6 [4:0]					0D
	1	1	↑	XX	0	0	0	0	VP13 [3:0]				06
	1	1	↑	XX	0	VP20 [6:0]							43
	1	1	↑	XX	VP36 [3:0]				VP27 [3:0]				75
	1	1	↑	XX	0	VP43 [6:0]							33
	1	1	↑	XX	0	0	0	0	VP50 [3:0]				06
	1	1	↑	XX	0	0	0	VP57 [4:0]					0E
	1	1	↑	XX	0	0	0	0	VP59 [3:0]				00
	1	1	↑	XX	0	0	VP61 [5:0]						0C
	1	1	↑	XX	0	0	VP62 [5:0]						09
	1	1	↑	XX	0	0	0	0	VP63 [3:0]				08
Negative Gamma Correction	0	1	↑	XX	1	1	1	0	0	0	0	1	E1h
	1	1	↑	XX	0	0	0	0	VN0 [3:0]				08
	1	1	↑	XX	0	0	VN1 [5:0]						2B
	1	1	↑	XX	0	0	VN2 [5:0]						2D
	1	1	↑	XX	0	0	0	0	VN4 [3:0]				04
	1	1	↑	XX	0	0	0	VN6 [4:0]					10
	1	1	↑	XX	0	0	0	0	VN13 [3:0]				04
	1	1	↑	XX	0	VN20 [6:0]							3E
	1	1	↑	XX	VN36 [3:0]				VN27 [3:0]				24
	1	1	↑	XX	0	VN43 [6:0]							4E
	1	1	↑	XX	0	0	0	0	VN50 [3:0]				04
	1	1	↑	XX	0	0	0	VN57 [4:0]					0F
	1	1	↑	XX	0	0	0	0	VN59 [3:0]				0E
	1	1	↑	XX	0	0	VN61 [5:0]						35
	1	1	↑	XX	0	0	VN62 [5:0]						38
	1	1	↑	XX	0	0	0	0	VN63 [3:0]				0F
Digital Gamma Control 1	0	1	↑	XX	1	1	1	0	0	0	1	0	E2h
1st Parameter	1	1	↑	XX	RCA0 [3:0]				BCA0 [3:0]				XX
2nd Parameter	1	1	↑	XX	RCA1 [3:0]				BCA1 [3:0]				XX
3rd Parameter	1	1	↑	XX	RCA2 [3:0]				BCA2 [3:0]				XX
4th Parameter	1	1	↑	XX	RCA3 [3:0]				BCA3 [3:0]				XX
5th Parameter	1	1	↑	XX	RCA4 [3:0]				BCA4 [3:0]				XX
6th Parameter	1	1	↑	XX	RCA5 [3:0]				BCA5 [3:0]				XX
7th Parameter	1	1	↑	XX	RCA6 [3:0]				BCA6 [3:0]				XX
8th Parameter	1	1	↑	XX	RCA7 [3:0]				BCA7 [3:0]				XX
9th Parameter	1	1	↑	XX	RCA8 [3:0]				BCA8 [3:0]				XX
10th Parameter	1	1	↑	XX	RCA9 [3:0]				BCA9 [3:0]				XX
11th Parameter	1	1	↑	XX	RCA10 [3:0]				BCA10 [3:0]				XX
12th Parameter	1	1	↑	XX	RCA11 [3:0]				BCA11 [3:0]				XX
13th Parameter	1	1	↑	XX	RCA12 [3:0]				BCA12 [3:0]				XX
14th Parameter	1	1	↑	XX	RCA13 [3:0]				BCA13 [3:0]				XX
15th Parameter	1	1	↑	XX	RCA14 [3:0]				BCA14 [3:0]				XX
16th Parameter	1	1	↑	XX	RCA15 [3:0]				BCA15 [3:0]				XX

Digital Gamma Control 2	0	1	↑	XX	1	1	1	0	0	0	1	1	E3h
1st Parameter	1	1	↑	XX	RFA0 [3:0]				BFA0 [3:0]				XX
2nd Parameter	1	1	↑	XX	RFA1 [3:0]				BFA1 [3:0]				XX
3rd Parameter	1	1	↑	XX	RFA2 [3:0]				BFA2 [3:0]				XX
4th Parameter	1	1	↑	XX	RFA3 [3:0]				BFA3 [3:0]				XX
5th Parameter	1	1	↑	XX	RFA4 [3:0]				BFA4 [3:0]				XX
6th Parameter	1	1	↑	XX	RFA5 [3:0]				BFA5 [3:0]				XX
7th Parameter	1	1	↑	XX	RFA6 [3:0]				BFA6 [3:0]				XX
8th Parameter	1	1	↑	XX	RFA7 [3:0]				BFA7 [3:0]				XX
9th Parameter	1	1	↑	XX	RFA8 [3:0]				BFA8 [3:0]				XX
10th Parameter	1	1	↑	XX	RFA9 [3:0]				BFA9 [3:0]				XX
11th Parameter	1	1	↑	XX	RFA10 [3:0]				BFA10 [3:0]				XX
12th Parameter	1	1	↑	XX	RFA11 [3:0]				BFA [3:0]				XX
13th Parameter	1	1	↑	XX	RFA12 [3:0]				BFA12 [3:0]				XX
14th Parameter	1	1	↑	XX	RFA13 [3:0]				BFA13 [3:0]				XX
15th Parameter	1	1	↑	XX	RFA14 [3:0]				BFA14 [3:0]				XX
16th Parameter	1	1	↑	XX	RFA15 [3:0]				BFA15 [3:0]				XX
17th Parameter	1	1	↑	XX	RFA16 [3:0]				BFA16 [3:0]				XX
18th Parameter	1	1	↑	XX	RFA17 [3:0]				BFA17 [3:0]				XX
19th Parameter	1	1	↑	XX	RFA18 [3:0]				BFA18 [3:0]				XX
20th Parameter	1	1	↑	XX	RFA19 [3:0]				BFA19 [3:0]				XX
21st Parameter	1	1	↑	XX	RFA20 [3:0]				BFA20 [3:0]				XX
22nd Parameter	1	1	↑	XX	RFA21 [3:0]				BFA21 [3:0]				XX
23rd Parameter	1	1	↑	XX	RFA22 [3:0]				BFA22 [3:0]				XX
24th Parameter	1	1	↑	XX	RFA23 [3:0]				BFA23 [3:0]				XX
25th Parameter	1	1	↑	XX	RFA24 [3:0]				BFA24 [3:0]				XX
26th Parameter	1	1	↑	XX	RFA25 [3:0]				BFA25 [3:0]				XX
27th Parameter	1	1	↑	XX	RFA26 [3:0]				BFA26 [3:0]				XX
28th Parameter	1	1	↑	XX	RFA27 [3:0]				BFA27 [3:0]				XX
29th Parameter	1	1	↑	XX	RFA28 [3:0]				BFA28 [3:0]				XX
30th Parameter	1	1	↑	XX	RFA29 [3:0]				BFA29 [3:0]				XX
31st Parameter	1	1	↑	XX	RFA30 [3:0]				BFA30 [3:0]				XX
32nd Parameter	1	1	↑	XX	RFA31 [3:0]				BFA31 [3:0]				XX
33rd Parameter	1	1	↑	XX	RFA32 [3:0]				BFA32 [3:0]				XX
34th Parameter	1	1	↑	XX	RFA33 [3:0]				BFA33 [3:0]				XX
35th Parameter	1	1	↑	XX	RFA34 [3:0]				BFA34 [3:0]				XX
36th Parameter	1	1	↑	XX	RFA35 [3:0]				BFA35 [3:0]				XX
37th Parameter	1	1	↑	XX	RFA36 [3:0]				BFA36 [3:0]				XX
38th Parameter	1	1	↑	XX	RFA37 [3:0]				BFA37 [3:0]				XX

39th Parameter	1	1	↑	XX	RFA38 [3:0]				BFA38 [3:0]				XX
40th Parameter	1	1	↑	XX	RFA39 [3:0]				BFA39 [3:0]				XX
41st Parameter	1	1	↑	XX	RFA40 [3:0]				BFA40 [3:0]				XX
42nd Parameter	1	1	↑	XX	RFA41 [3:0]				BFA41 [3:0]				XX
43rd Parameter	1	1	↑	XX	RFA42 [3:0]				BFA42 [3:0]				XX
44th Parameter	1	1	↑	XX	RFA43 [3:0]				BFA43 [3:0]				XX
45th Parameter	1	1	↑	XX	RFA44 [3:0]				BFA44 [3:0]				XX
46th Parameter	1	1	↑	XX	RFA45 [3:0]				BFA45 [3:0]				XX
47th Parameter	1	1	↑	XX	RFA46 [3:0]				BFA46 [3:0]				XX
48th Parameter	1	1	↑	XX	RFA47 [3:0]				BFA47 [3:0]				XX
49th Parameter	1	1	↑	XX	RFA48 [3:0]				BFA48 [3:0]				XX
50th Parameter	1	1	↑	XX	RFA49 [3:0]				BFA49 [3:0]				XX
51st Parameter	1	1	↑	XX	RFA50 [3:0]				BFA50 [3:0]				XX
52nd Parameter	1	1	↑	XX	RFA51 [3:0]				BFA51 [3:0]				XX
53rd Parameter	1	1	↑	XX	RFA52 [3:0]				BFA52 [3:0]				XX
54th Parameter	1	1	↑	XX	RFA53 [3:0]				BFA53 [3:0]				XX
55th Parameter	1	1	↑	XX	RFA54 [3:0]				BFA54 [3:0]				XX
56th Parameter	1	1	↑	XX	RFA55 [3:0]				BFA55 [3:0]				XX
57th Parameter	1	1	↑	XX	RFA56 [3:0]				BFA56 [3:0]				XX
58th Parameter	1	1	↑	XX	RFA57 [3:0]				BFA57 [3:0]				XX
59th Parameter	1	1	↑	XX	RFA58 [3:0]				BFA58 [3:0]				XX
60th Parameter	1	1	↑	XX	RFA59 [3:0]				BFA59 [3:0]				XX
61st Parameter	1	1	↑	XX	RFA60 [3:0]				BFA60 [3:0]				XX
62nd Parameter	1	1	↑	XX	RFA61 [3:0]				BFA61 [3:0]				XX
63rd Parameter	1	1	↑	XX	RFA62 [3:0]				BFA62 [3:0]				XX
64th Parameter	1	1	↑	XX	RFA63 [3:0]				BFA63 [3:0]				XX
Interface Control	0	1	↑	XX	1	1	1	1	0	1	1	0	F6h
	1	1	↑	XX	MY_EOR	MX_EOR	MV_EOR	0	BGR_EOR	0	0	WEMODE	01
	1	1	↑	XX	0	0	EPF [1:0]		0	0	MDT [1:0]		00
	1	1	↑	XX	0	0	ENDIAN	0	DM [1:0]		RM	RIM	00
Power Control A	0	1	↑	XX	1	1	0	0	1	0	1	1	CBh
	1	1	↑	XX	0	0	1	1	1	0	0	1	39
	1	1	↑	XX	0	0	1	0	1	1	0	0	2C
	1	1	↑	XX	0	0	0	0	0	0	0	0	00
	1	1	↑	XX	0	0	1	1	0	REG_VD[2:0]			30
	1	1	↑	XX	0	0	0	0	0	VBC[2:0]			01
Power Control B	0	1	↑	XX	1	1	0	0	1	1	1	1	CFh
	1	1	↑	XX	0	0	0	0	0	0	0	0	00
	1	1	↑	XX	1	PCEQ	DRV_ena	Power control[1:0]		0	0	1	81
	1	1	↑	XX	DRV_vml[2:1]		1	DC_ena	DRV_vml[0]	DRV_vmh[2:0]			30
Driver timing control A	0	1	↑	XX	1	1	1	0	1	0	0	0	E8h
	1	1	↑	XX	CR/EQ/PC	SDT[1:0]		0	0	1	0	NOW	84
	1	1	↑	XX	0	0	EQ[2:0]			CR[2:0]			11

	1	1	↑	XX	0	1	1	1	1	PC[1:0]			7A
Driver timing control B	0	1	↑	XX	1	1	1	0	1	0	0	1	E9h
	1	1	↑	XX	CRE/EQE /PCE	SDT[1:0]		0	0	1	0	NOWE	04
	1	1	↑	XX	0	0	EQ[2:0]			CR[2:0]			11
	1	1	↑	XX	0	1	1	1	1	PC[1:0]			7A
Driver timing control C	0	1	↑	XX	1	1	1	0	1	0	1	0	EAh
	1	1	↑	XX	VG_SW_T4		VG_SW_T3		VG_SW_T2		VG_SW_T1		66
Power on sequence control	0	1	↑	XX	1	1	1	0	1	1	0	1	EDh
	1	1	↑	XX	0	1	CP1 soft start		0	1	CP23 soft start		55
	1	1	↑	XX	0	0	En_vcl		0	0	En_ddvdh		01
	1	1	↑	XX	0	0	En_vgh		0	0	En_vgl		23
	1	1	↑	XX	DDVDH_ENH		0	0	0	0	0	1	01
Enable 3G	0	1	↑	XX	1	1	1	1	0	0	1	0	F2h
	1	1	↑	XX	0	0	0	0	0	0	1	3G_enb	02

Note 1: Undefined commands are treated as NOP (00h) command.

Note 2: B0 to D9 and DE to FF are for factory use of display supplier. USER can decide if these commands are available or they are treated as NOP (00h) commands before shipping to USER. Default value is NOP (00h).

Note 3: Commands 10h, 12h, 13h, 26h, 28h, 29h, 30h, 36h (Bit D4 only), 38h and 39h are updated during V-SYNC when ILI9341S is in Sleep OUT mode to avoid abnormal visual effects. During Sleep IN mode, these commands are updated immediately. Read status (09h), Read display power mode (0Ah), Read display MADCTL (0Bh), Read display pixel format (0Ch), Read display image mode (0Dh), Read display signal mode (0Eh) and Read display self diagnostic result (0Fh) of these commands are updated immediately both in Sleep IN mode and Sleep OUT mode.

8. TOUCH PANEL CHARACTERISTICS

8.1. Electrical Characteristics

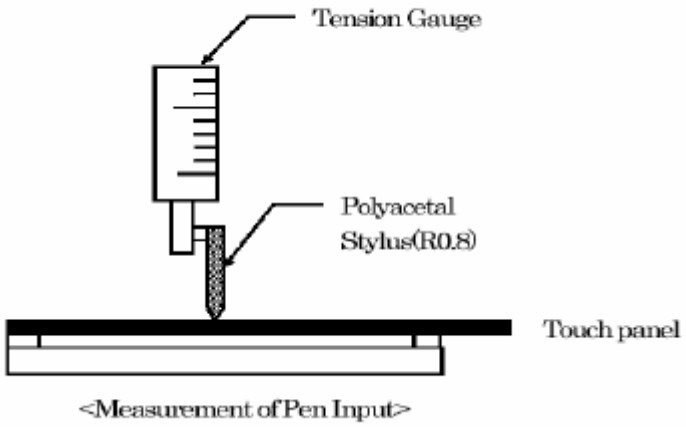
Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Linearity	--	--	3.0	%	Analog X and Y directions
Terminal Resistance	440	-	1100	Ω	X(Film side)
	100	-	420	Ω	Y(Glass side)
Insulation resistance	25	-	-	MΩ	DC 25V
Voltage	-	-	10	V	DC
Chattering	-	-	10	ms	100kΩ pull-up
Transparency	78	-	-	%	

Note: Avoid operating with hard or sharp material such as a ball point pen or a mechanical pencil except a polyacetal pen (tip R0.8mm or less) or a finger.

8.2. Mechanical & Reliability Characteristics

Item	Value			Unit	Remark
	Min.	Typ.	Max.		
Active force	20	-	100	gf	Note 1
Durability-surface scratching	Write 100,000	-	-	characters	Note 2
Durability-surface pitting	1,000,000	-	-	touches	Note 3
Surface hardness	3	-	-	H	

Note 1: Active force test condition
(1) Input DC 5V on Xdirection, Drop off Polyacetal Stylus (R0.8), until output voltage stabilize ,then get the activation force。
(2) R8.0mm Silicon rubber for finger Activation force test
(3) Test point: 9 points



<Measurement of Pen Input>

Note 2: Measurement for surface area.
-Scratch 100,000 times straight line on the film with a stylus change every 20,000 times.
-Force: 150gf.
-Speed: 60mm/sec.
-Stylus: R0.8 polyacetal tip.
Note 3: Pit 1,000,000 times on the film with a R0.8 silicon rubber.
-Force: 250gf.
-Speed: 2times/sec.

9. PRODUCT QUALITY & RELIABILITY

1.AQL(Acceptable Quality Level

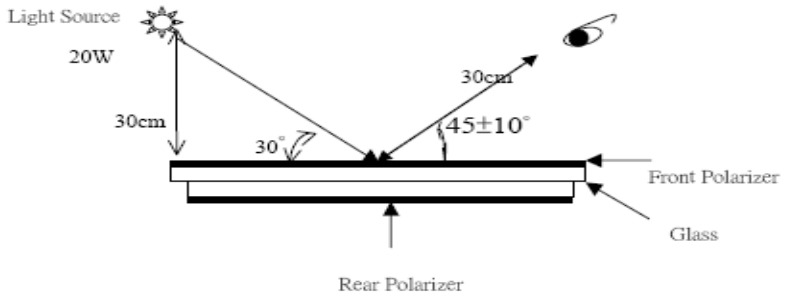
AQL of major and minor defect.

	MAJOR DEFECT	MINOR DEFECT
AQL	0.65	1.0

2. Basic conditions for inspection

The LCM face to us, in normal environment, the lux is 1000±200.(Darkroom's lux: 100±50),About an angle of incidence 30,a distance of 30 cm with an angle of 45 degree to check the products without uncovering the film!

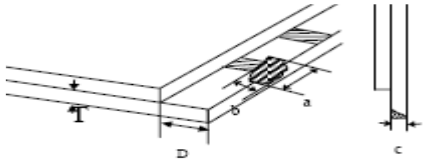
(As shown below)

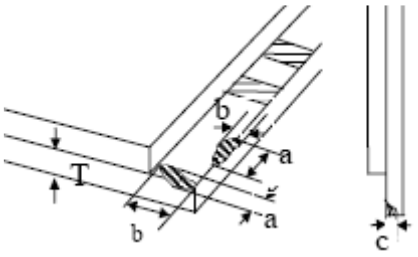
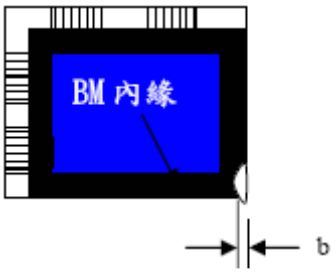


3.Inspection item and criteria

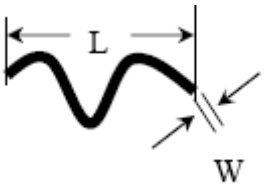
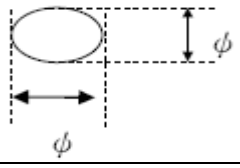
3.1 Visual inspection criterion in immobility

3.1.1Glass defect

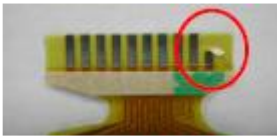
NO	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1. Linear cracks panel 【Reject】 2. Nonlinear crack contrast by limited sample	
3	Glass extrude the conductive area (minor defect)	a: disregards and no influence assemblage. 1) b≤1/3Pin width(non bonding area) 【Accept】 2)bonding area≤0.5㎜ 【Accept】	A: Length, b: Width
4	Pin-side ,conductive area damaged (minor defect)	(a c: disregards) b≤1/3of effective length for bonding electrode 【Accept】	a: length, b: Width, c: Thickness 
5	Pin-side,non-conductive area damaged	1)Damage area don't touch the ITO (Inclueling contraposition mark,	a: Length, b: Width c: Thickness

	(minor defect)	except scribing mark) 【Accept】 2)C<T b≦BM1/3of width 【Accept】 3)c=T b not touch the seal glue 【Accept】 4)a disregards	
6	Non-pin-side damage (minor defect)	c<T 1)b exceeds 1/3Bm 【Reject】 c=T b not touch the seal glue 【Reject】	c: Thickness b: width of  damage

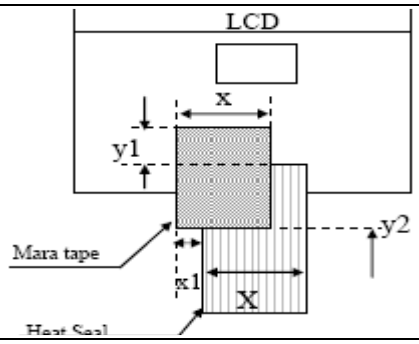
3.1.2LCD appearance defect(View area)

NO	Defect item	Criteria		Remark
1	Fiber、glass cratch、polarizer scratch/folded (minor defect)	Specification	Allowable	note1:L: Length, W: Width note2: disregard if out of AA 
		W≦0.03mm	disregard	
		0.03mm<W≦0.05mm; L≦3.0mm	2	
		0.05mm<W≦0.1mm; L≦3.0mm	1	
		W>0.1mm;L>3.0mm	0	
2	Polarizer bubble、concave and convex (minor defect)	ϕ≦0.2mm	disregard	note1: ϕ=(L+W)/2, L:Length, W :Width note2:disregard if out of AA
		0.2mm<ϕ≦0.3mm	2	
		0.3mm<ϕ≦0.5mm	1	
		0.5mm<ϕ	0	
3	Black dots、dirty dots、impurities、eye winker (minor defect)	ϕ≦0.15mm	disregard	note2:disregard if out of AA 
		0.15mm<ϕ≦0.25mm	2	
		0.25mm<ϕ≦0.3mm	1	
		0.3mm<ϕ	0	
4	Polarizer prick (minor defect)	ϕ≦0.1mm	disregard	note1: ϕ=(L+W)/2, L=Length, W=Width note2:the distance between two dots>5mm
		0.1mm<ϕ≦0.25mm	3	
		ϕ>0.25mm	0	

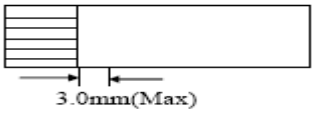
3.1.3FPC

NO	Defect item	Criteria		Remark
1	Copper screen peel (minor defect)	Copper screen peel 【Reject】		
2	No release tape or peel	No release tape or peel 【Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification	Allowable	Note1: Cannot have stride ITO impurities
		ϕ ≦0.25mm	2	
		ϕ >0. 25	0	

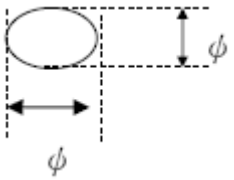
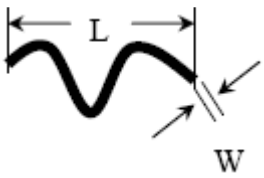
3.1.4Black tape &Mara tape

NO	Defect item	Criteria	Remark
1	FPC or H/S black tape (minor defect)	1. shift spec: 1) glue to the polarize 【Reject】 2) IC bare 【Reject】 2. left-and-right spec: 1)exceed of FPC edge or H-S edge【Reject】 2) IC bare 【Reject】	
2	No black tape (major defect)	No black tape 【Reject】	
3	Tape position mistake (minor defect)	Not by engineering drawing	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film 【Reject】	

3.1.5Silicon and Taffy glue

NO	Defect item	Criteria	Remark
1	Quantity of silicon (major defect)	Uncover the ITO and circuit area 【Reject】	note: compared by engineering
2	Taffy glue (major defect)	1.Uncover the reveal copper area 【Reject】 2.Cover layer 0.3mm(Min)~3.0mm(Max) 【Reject】	note: if customer has special requirement, refer to the technical document 
3	Depth of glue covering (major defect)	Depth of glue covering overtop front Polarizer 【Reject】	Except of the special requirement

3.2 Electrical criteria

NO	Defect item	Criteria	Remark	
1	No display (major defect)	No display 【Reject】		
2	Missing line (major defect)	Missing line 【Reject】		
3	Seg-com light and dark (major defect)	Seg-com light and dark 【Reject】	ND filter 2% test	
4	No display in immobility (major defect)	No display in immobility 【Reject】		
5	Flicker of Pattern (major defect)	Flicker of Pattern 【Reject】		
6	Mura (major defect)	ND filter 2%test		
7	Over current (major defect)	Over current 【Reject】		
8	Voltage out of specification (major defect)	Voltage out of specification 【Reject】		
9	Pattern blur, error code (major defect)	Pattern blur, error code 【Reject】		
10	Dark light, Flicker (major defect)	Dark light, Flicker 【Reject】		
11	Black/white dots 、 Dirty dots、eye winker (major defect)	Specification	Allowable	Note1:disregard if out of AA 
		Φ ≦0.15mm	disregard	
		0.15mm< Φ ≦0. 25mm	2	
		0.25mm< Φ ≦0. 3mm	1	
		0.3mm< Φ	0	
12	Fiber、glass crutch、Polarizer scratch/folded (major defect)	W≦0.03mm	disregard	Note1:L: Length, W: Width Note2: disregard if out of AA 
		0.03mm<W≦0. 0. 05mm L≦3. 0mm	2	
		0.05mm<W≦0. 1mm L≦3. 0mm	1	
		W>0.1mm;L>3.0mm	0	

4.Reliability

Item NO.	TEST Item	CONDITION	CRITERION
1	Humidity Temperature	40℃±2℃, , 240 hrs	Placed 2 hours in normal temperature,then inspect the function and cosmetic after test. After testing, cosmetic defects should not happen. Contrast ratio should not happen lower than 10% of initial value.Total current consumption should not be over 10% of initial value.Polarizers may fail in humidity test, but only this failure is allowable.
2	Thermal shock test	25℃±2℃→-30℃±2℃→25℃±2℃ →70℃±2℃ 5(min) 120(min) 5(min) 120(min)， 60cycle	
3	High temperature operating	70℃±2℃ 240Hrs	
4	Low temperature operating	-20℃±2℃ 240 hrs	
5	High temperature storage	80℃±2℃ 240Hrs	
6	Low temperature storage	-30℃±2℃ 240Hrs	
7	Packing drop test	1 corner 3 edges six faces, with carton packing, 1m height, concrete ground	After testing, inspect the packing and product Packing broken length<2cm, LCD visual and function check
8	LCM drop test	0.5m height, top and bottom sides, each side 5 times.	After testing, inspect the LCM, Function and cosmetic defects should not happen
9	ESD	150 pF 330Ω ±8KV 10 times air discharge （with Phone test)	After testing, cosmetic and electrical defects should not happen. Total current consumption should be below double of initial value.
10	Solderability test	245±5℃ ,3-5s ,by magnifier	last tin degree≥95% ;The pinhole or empty caves can't concentrate a place or don't exceed 5% of the total area.
11	Tin-adhesion test	non-Pb soldering, 360℃ ,5 cycles to solder and strip	copper is whole
12	LCD FPC bending test	Put 1mm diameter pole at fold line,fold the FPC cable as +/- 90 degree or+/-180degree from PCB side to connector side; 100 times.	After testing, inspect the LCD,function and cosmetic defects should not happen.
13	Hydrostatic test	Put the LCM on the plate , Use the 10mm diameter pole to press the center of the LCM with the velocity 10mm/min, when the LCM crush,	pressure > 300N is OK.
14	Vibration test	10~55~10Hz amplitude : 1.5mm 2hrs for each direction(X, Y, Z)	Not allowed cosmetic and electrical defects. test will be performed at state of carton box,not each of the modules
15	LCD bending test	Put the LCM on the plate like the picture , Use the 10mm diameter pole to press the center of the LCM with the velocity 10mm/min , until the force is 70N and keep 5s ,(X, Y direction both)	After testing, inspect the LCD,Not allowed crush and transmutation.

10.PRECAUTIONS IN USING

10.1 Liquid crystal display (LCD)

The LCD panel is made up of glass, organic fluid and polarizer. When handling, please pay attention to the following items:

1) Keep the operation and storage temperature of the LCD within the range specified in the LCD specification. Otherwise, excessive temperature and humidity would cause polarization degradation, bubble generation or polarizer peel-off.
2) Prevent it from mechanical shock by dropping it from a high place, etc.
3) Don't contact, push or rub the exposed polarizers with anything harder than HB pencil lead.
4) Avoid using chemicals such as acetone, toluene, ethanol and isopropyl alcohol to clean the front/rear polarizers and reflectors, which will cause damage to them.
5) Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause deformation or color fading. The LCM is assembled and adjusted with a high degree of precision.
6) Do not put or attach anything on the display area. Avoid touching the display area with bare hand.

10.2 Precaution for handling LCD modules

The LCM is assembled and adjusted with a high degree of precision, do not applying excessive shocks to it or making any alterations or modifications to it, the following precautions should be taken when handing.

1) Do not drop, bend or twist the module.
2) Do not alter or making any modification on the shape of the metal frame.
3) Do not change the shape, the pattern wiring or add any extra hole on the PCB.
4) Do not modify or touch the zebra rubber strip(conductive rubber) with another object.
5) Do not change the positions of components on the PCB.

10.3 Electro-static discharge control

Careful attention should be paid to control the electrostatic discharge of the modules, since the modules contain no. of CMOS LSI.

1) Make sure you are grounded properly when remove the module from its antistatic bag. Be sure that the module and have the same electric potential.
2) Only properly grounded soldering iron should be used.
3) Modules should be stored in antistatic bag or other containers resistant to static after remove from its original package.
4) When using the electric screw-driver is used, make sure the screw driver had been ground potentiality to minimize the transmission of EM wave produced by commutator sparks.
5) In order to reduce the generation of static electricity, a relative humidity of 50-60% is recommended.

10.4 Precaution for soldering

9.4.1 Soldering should apply to FPC .

1) The soldering temperature is **340±20**℃ for lead-free solder
2) Soldering time 1~3 seconds.
3) Eutectic solder (rosin flux filled) should be used.
4) If soldering flux is used, be sure to remove any remaining flux after finishing the soldering operation and LCD surface should be covered during soldering to prevent any damage to flux spatters.
5) When remove the lead wires from the I/O terminals, use proper de-soldering methods, e.g. suction type de-soldering irons. Do not repeat wiring by soldering more than three times at the pads and plated though holes may be damaged.

10.5 Precaution for operation

1) Adjust liquid crystal driving voltage (Vo) to varies viewing angle and obtain the contrast.
2) Vo should be kept in proper range stated in the specification. Excess voltage will shorten the LCD life.
3) Response time is greatly delayed at low temperature. It will recover when go back to normal temperature.
4) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore it should be used under the relative condition of 50% RH.

10.6 Storage

When long term storage is required, following precautions are necessary:

1) The LCD should not be store in high temperature or high humidity.

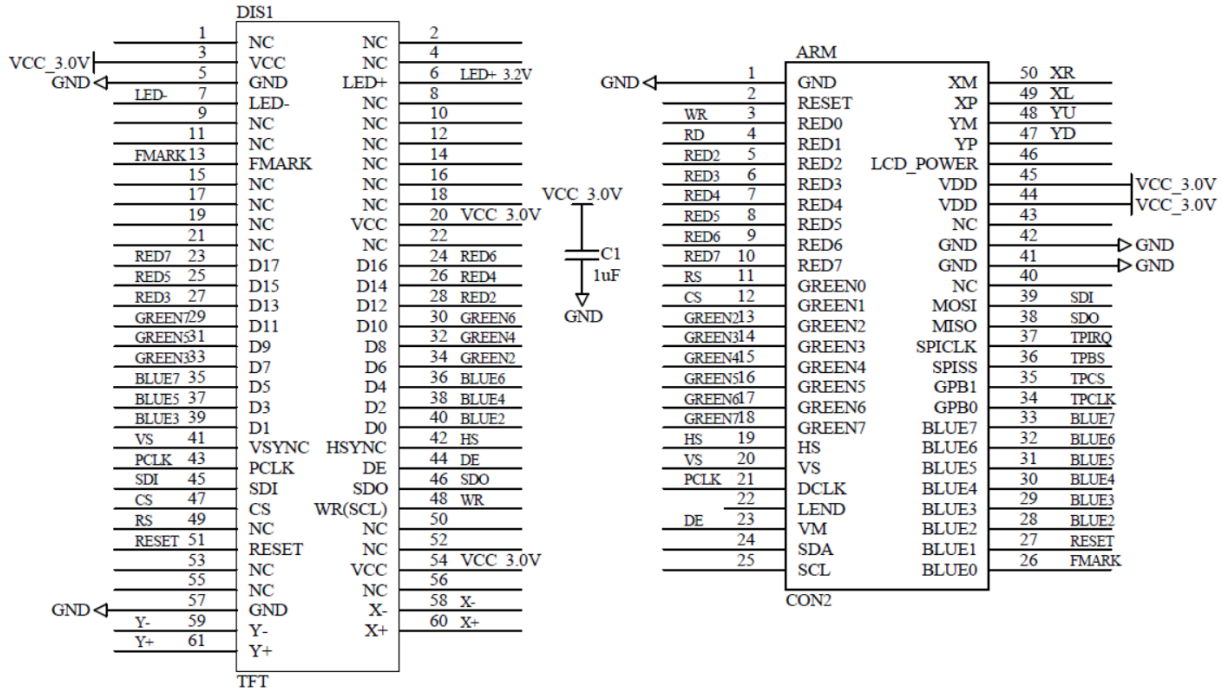
   For long time storage , the temperature should be 15~35 degree, and relative humidity should be less than 65%.

2) The LCD should be store in darkness, to avoid sunlight.

3) Pls don't let wet steam or water drop get into the LCD, otherwise the polarizer or ITO electrode will be damaged slowly.

11. APPLICATION

11.1 REFERENCE CIRCU



11.2 APPENDIX

```
    LCD_RESET_H;
    Delay(20);
    LCD_RESET_L;
    Delay(200);
    LCD_RESET_H;
    Delay(500);
    //************** Start Initial Sequence **********//
    SPI_WriteComm(0xCF);
SPI_WriteData(0x00);
SPI_WriteData(0xCB);
SPI_WriteData(0X30);

SPI_WriteComm(0xED);
SPI_WriteData(0x64);
SPI_WriteData(0x03);
SPI_WriteData(0X12);
SPI_WriteData(0X81);

SPI_WriteComm(0xE8);
SPI_WriteData(0x85);
SPI_WriteData(0x10);
SPI_WriteData(0x7A);
```

```
SPI_WriteComm(0xCB);
SPI_WriteData(0x39);
SPI_WriteData(0x2C);
SPI_WriteData(0x00);
SPI_WriteData(0x34);
SPI_WriteData(0x02);

SPI_WriteComm(0xF7);
SPI_WriteData(0x20);

SPI_WriteComm(0xEA);
SPI_WriteData(0x00);
SPI_WriteData(0x00);

SPI_WriteComm(0xC0);       //Power control
SPI_WriteData(0x21);     //VRH[5:0]

SPI_WriteComm(0xC1);       //Power control
SPI_WriteData(0x11);     //SAP[2:0];BT[3:0]

SPI_WriteComm(0xC5);       //VCM control
SPI_WriteData(0x3F);
SPI_WriteData(0x3C);

SPI_WriteComm(0xC7);       //VCM control2
SPI_WriteData(0XAF);

SPI_WriteComm(0x36);       // Memory Access Control
SPI_WriteData(0x08);

SPI_WriteComm(0x3A);
SPI_WriteData(0x55);

SPI_WriteComm(0xB1);
SPI_WriteData(0x00);
SPI_WriteData(0x1B);

SPI_WriteComm(0xB6);       // Display Function Control
SPI_WriteData(0x0A);
SPI_WriteData(0xA2);

////////////////RGB REGIST////////
SPI_WriteComm(0xB0);
SPI_WriteData(0xE0);
```

```
SPI_WriteComm(0xF6);
SPI_WriteData(0x01);
SPI_WriteData(0x00);
SPI_WriteData(0x07);
////////////////////////////////

SPI_WriteComm(0xF2);        // 3Gamma Function Disable
SPI_WriteData(0x00);

SPI_WriteComm(0x26);        //Gamma curve selected
SPI_WriteData(0x01);

SPI_WriteComm(0xE0);        //Set Gamma
SPI_WriteData(0x0F);
SPI_WriteData(0x23);
SPI_WriteData(0x20);
SPI_WriteData(0x0C);
SPI_WriteData(0x0F);
SPI_WriteData(0x09);
SPI_WriteData(0x4E);
SPI_WriteData(0XA8);
SPI_WriteData(0x3D);
SPI_WriteData(0x0B);
SPI_WriteData(0x15);
SPI_WriteData(0x06);
SPI_WriteData(0x0E);
SPI_WriteData(0x08);
SPI_WriteData(0x00);

SPI_WriteComm(0XE1);        //Set Gamma
SPI_WriteData(0x00);
SPI_WriteData(0x1C);
SPI_WriteData(0x1F);
SPI_WriteData(0x03);
SPI_WriteData(0x10);
SPI_WriteData(0x06);
SPI_WriteData(0x31);
SPI_WriteData(0x57);
SPI_WriteData(0x42);
SPI_WriteData(0x04);
SPI_WriteData(0x0A);
SPI_WriteData(0x09);
SPI_WriteData(0x31);
SPI_WriteData(0x37);
```

```
SPI_WriteData(0x0F);

SPI_WriteComm(0x11);       //Exit Sleep

SPI_WriteComm(0x29);

SPI_WriteComm(0xb0);
SPI_WriteData(0x80);

SPI_WriteComm(0xf6);
SPI_WriteData(0x00);
SPI_WriteData(0x00);
SPI_WriteData(0x06);

SPI_WriteComm(0xB5);
SPI_WriteData(0x02);
SPI_WriteData(0x02);
SPI_WriteData(0x0A);
SPI_WriteData(0x14);
}
```