

**SPECIFICATION  
FOR  
LCD Module**

**Customer P/N:**

**Santek P/N: ST0200U4W-RSLW-F**

**DOC. Revision: RS03**

**Customer Approval:**

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	<b>SIGNATURE</b>	<b>DATE</b>
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Document Revision History

Version	Revise Date	Description	Changed by
RS01	2018-05-30	First issue	Zhiyi
RS02	2018-09-06	Updated the standard of inspection for TFT (Page 20-25)	Zhiyi
RS03	2018-11-28	Updated the mechanical drawing(Page6) Correct PIN description(Page5,7,8)	Aaron Lu

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## 1. GENERAL SPECIFICATION

### 1.1.Description

The ST0200U4W-RSLW-F is a color active matrix Thin Film Transistor (TFT) Liquid Crystal Display (LCD) that uses amorphous silicon(a-Si) TFT as a switching device. This model is composed of a single 2.0 inches transmissive type main TFT-LCD panel. The resolution of the panel is 240\*320 pixels and can display up to 262K color.

### 1.2.Feature

- Structure COG+FPC+BL
- Full, Normal (Still), Partial, Sleep, mode are available

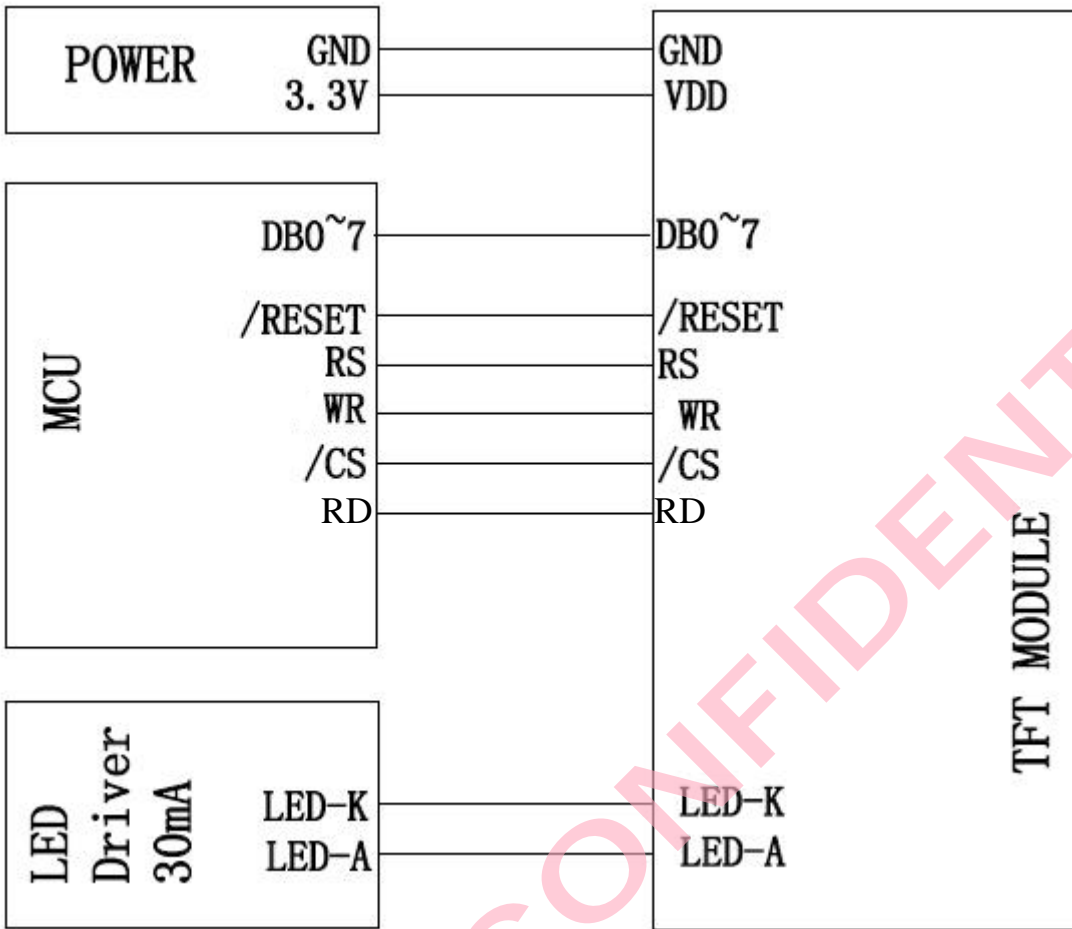
### 1.3.General Specification

No.	Item	Specification	Unit	Remark
1	LCD Size	2.0	inch	-
2	Panel Type	a-Si TFT transmissive	-	-
3	Resolution	240 x (RGB) x 320	pixel	-
4	Display Mode	Normally Black, Transmissive	-	-
5	Display Number of Colors	262K	-	-
6	Viewing Direction	ALL	-	Note
7	Contrast Ratio	800(Typ)	-	-
8	Luminance	330(MIN)	cd/m2	-
9	Module Size	35.7(W ) x51.2(L) x2.4(T)	mm	Note
10	Active Area	30.6(W) x 40.8(L)	mm	Note
11	Pixel Pitch	0.180(W ) x 0.180 (L)	mm	-
12	Weight	TBD(TYP)	g	-
13	Driver IC	ST7789V	-	-
14	Driver IC Size	1515X700X300	um	-
15	Light Source	4 White LEDs	-	-
16	Interface	8080 MCU 8bit	-	-
17	Operating Temperature	-20~70	°C	-

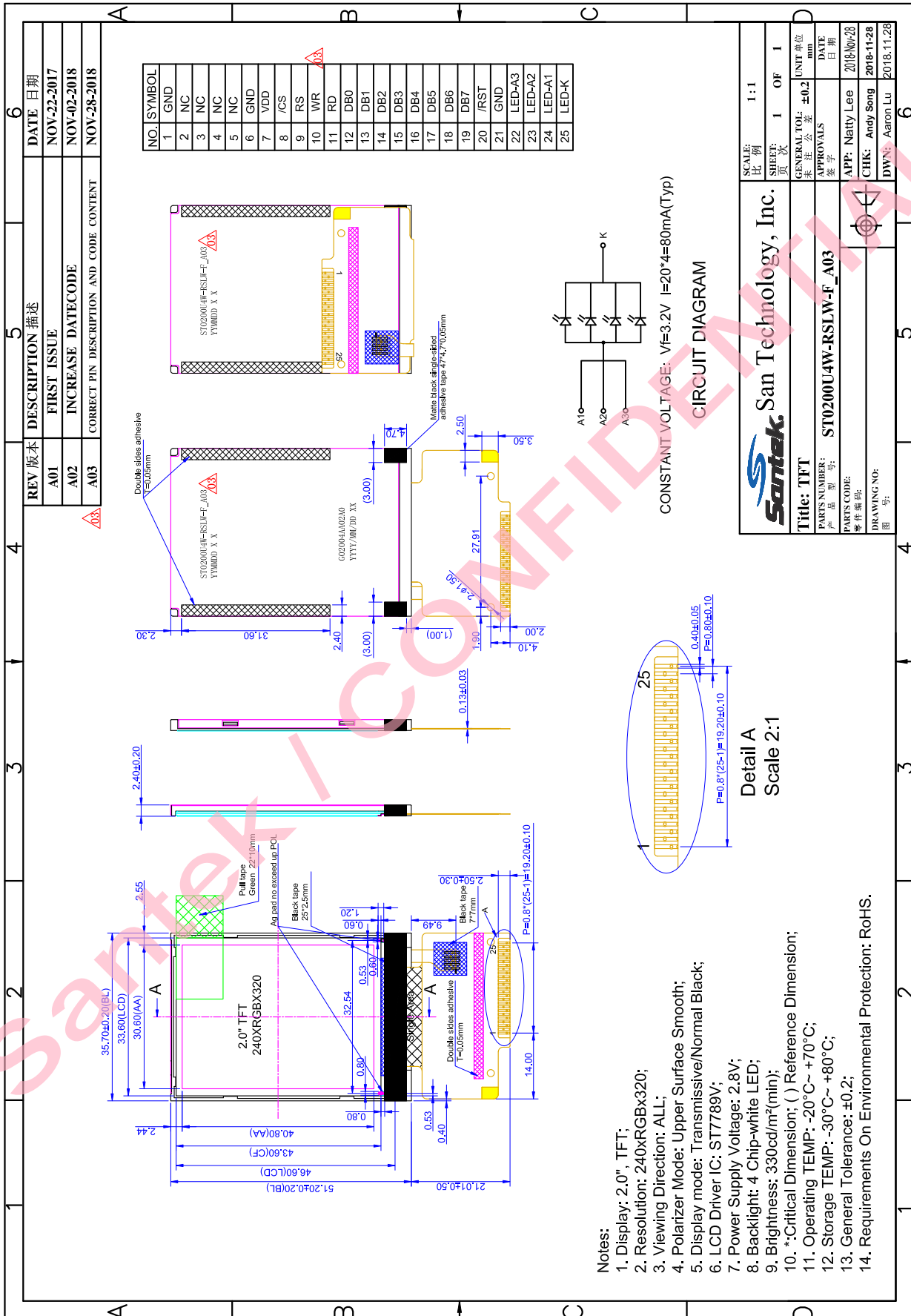
Note: Please refer to the mechanical drawing.

Note 1: The data order is as follows, MSB=D15, LSB=D0 and picture data is MSB=Bit 5.

2. BLOCK DIAGRAM



3. MECHANICAL DRAWING

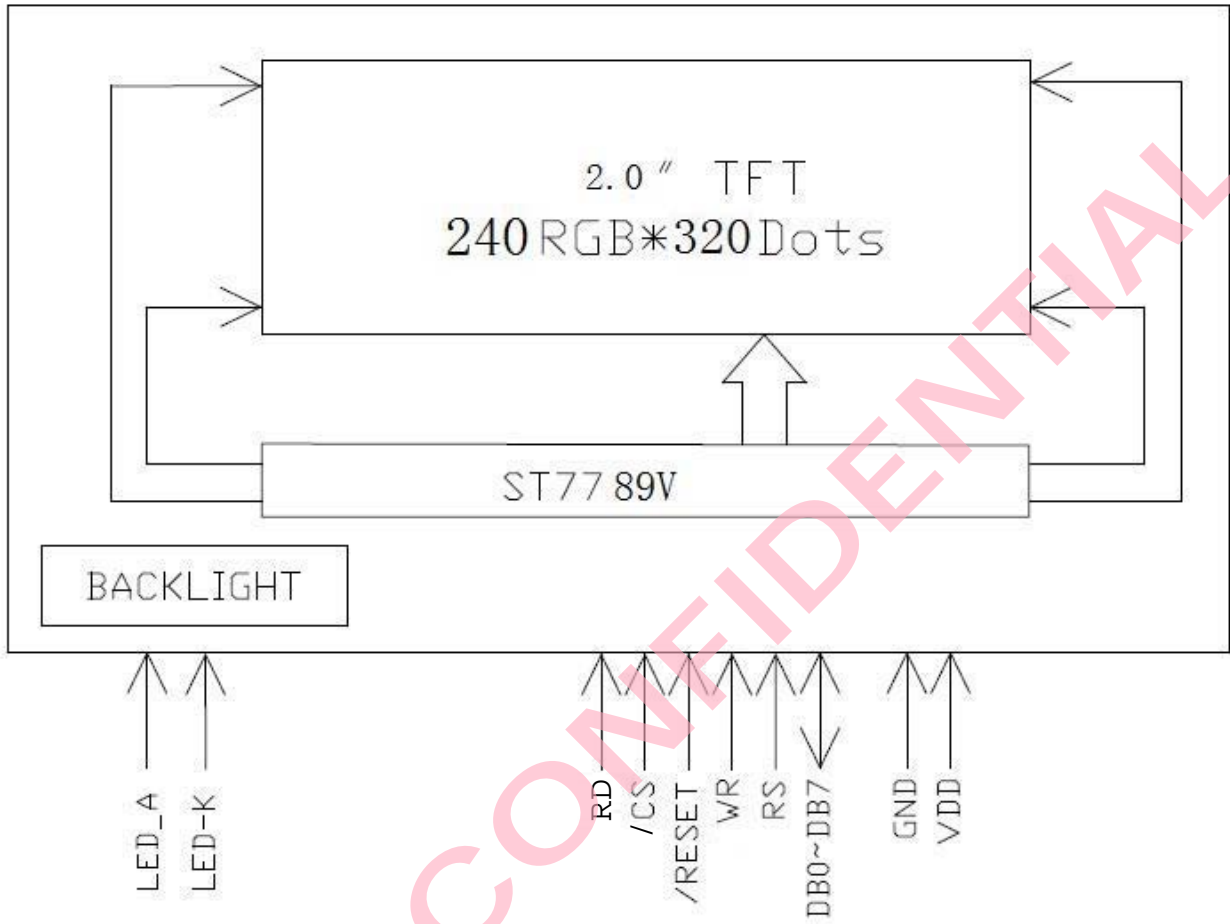


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**4. INTERFACE PIN ASSIGNMENT**

1	GND	Ground
2	NC	NC
3	NC	NC
4	NC	NC
5	NC	NC
6	GND	Ground
7	VDD	Power supply for system
8	/CS	Chip selection pin for TFT
9	RS	TFT display data/command selection pin for TFT
10	WR	Serves as a write signal and writes data at the rising edge
11	RD	Serves as a read signal and read data at the rising edge
12	DB0	Data bus
13	DB1	Data bus
14	DB2	Data bus
15	DB3	Data bus
16	DB4	Data bus
17	DB5	Data bus
18	DB6	Data bus
19	DB7	Data bus
20	/RST	The external reset input. Initializes the chip with a low input.
21	GND	Ground
22	LED-A3	Anode power supply for backlight (LED+).
23	LED-A2	Anode power supply for backlight (LED+).
24	LED-A1	Anode power supply for backlight (LED+).
25	LED-K	Cathode power supply for backlight (LED-).

**5. ELECTRICAL SPECIFICATION FOR TFT**  
**5.1. APPLICATION CIRCUIT**





**5.2. TFT ABSOLUTE MAXIMUM RATINGS**

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
Power Supply for Analog	VCC	Ta=25 °C	-0.3	-	5.5	V
Power Supply for Digital IO	IOVCC	Ta=25 °C	-0.3	-	3.5	V

Note: Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is applied.

**5.3. TFT TYPICAL OPERATION CONDITION**

5.3.1 TFT DC Characteristics

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
Power Supply for Analog	VDD	Ta=25 °C	2.5	2.8	3.5	V
Power Supply for Digital IO	IOVDD	Ta=25 °C	1.65	1.8	3.3	V
Input Signal "H" Level	V <sub>IH</sub>	-	0.7IOVDD	-	IOVDD	V
Input Signal "L" Level	V <sub>IL</sub>	-	0	-	0.3IOVDD	V
Output Signal "H" Level	V <sub>OH</sub>	I <sub>OH</sub> =-1.0mA	0.8IOVDD	-	IOVDD	V
Output Signal "L" Level	V <sub>OL</sub>	I <sub>OL</sub> =1.0mA	0	-	0.2IOVDD	V
Frame Frequency	FRAME	-	50	70	80	Hz

Note: To prevent IC latch up or DC operation in LCD panel, the power on/off sequence should follow the driver IC specification.

5.3.2 TFT Current Consumption

Item	Symbol	Values		Unit	Remark
		Type	Max.		
MIPI 2-Lane Interface					
Normal(Still) Mode	I <sub>CC1</sub>	40	60	mA	Note1
Standby Mode	I <sub>CC1</sub>	-	150	uA	Note2

Note1: Test Condition

Typ: IOVCC=VCI=2.85V

Display Pattern: All Pixel White

Frame Rate=60Hz at 2-dot Inversion

Max. current check pattern:

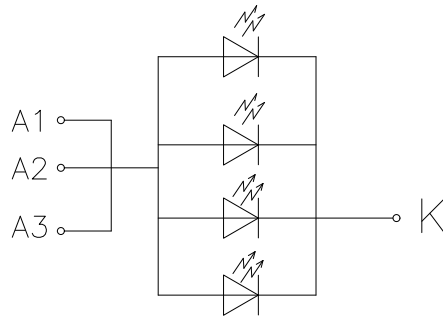


White

Note2: In the standby mode, all the internal display operations are suspended including the internal R-C oscillator.

#### 5.4. BACKLIGHT SPECIFICATION

##### 5.4.1 Backlight Circuit



#### LED CIRCUIT

CONSTANT VOLTAGE:  $V_f = 3.2V$   $I = 20 * 4 = 80mA$

##### 5.4.2 Electrical Characteristics

(T=25°C)

PARAMETER	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =80mA	2.8	3.2	3.5	v

5.5. 8080 SERIES MCU PARALLEL INTERFACE CHARACTERISTICS: 8-BIT BUS:

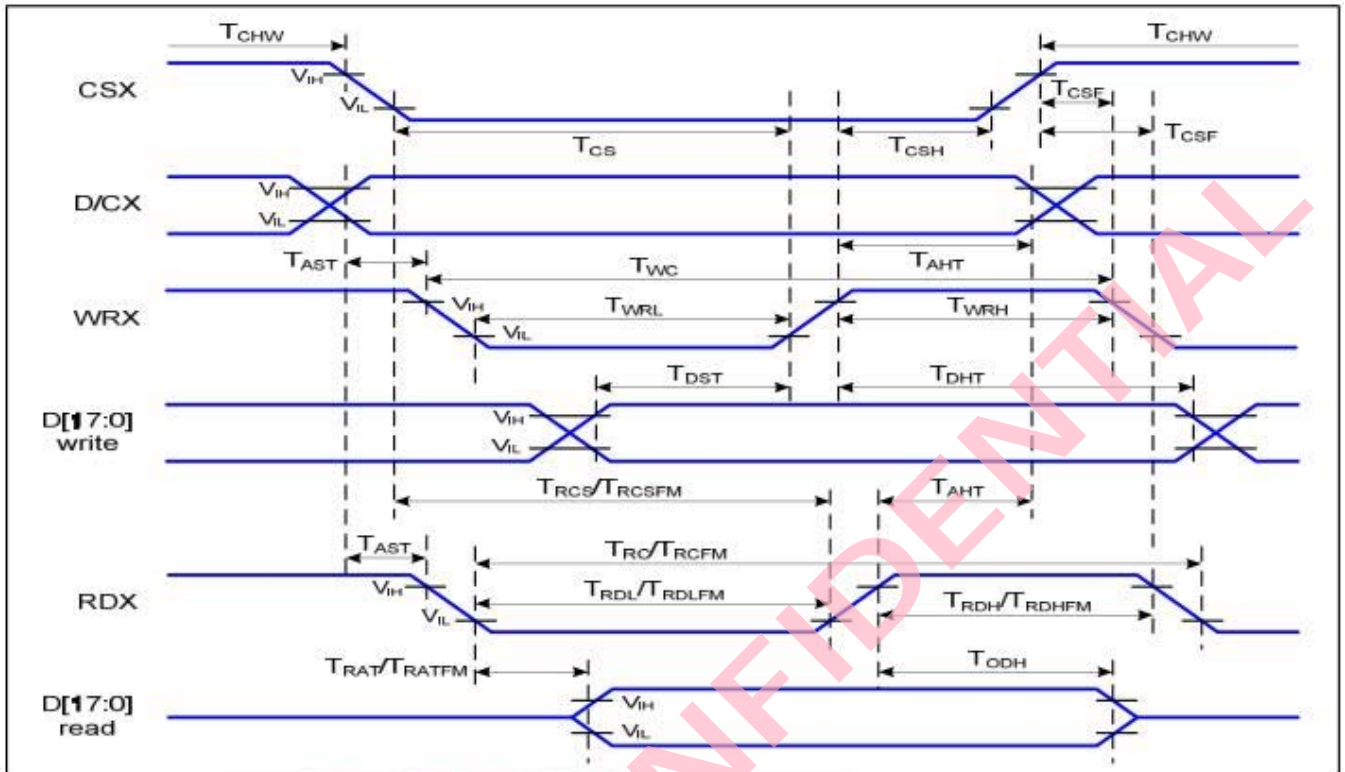


Fig 5.5.1 Parallel Interface Timing Characteristics (8080-Series MCU Interface)  
V<sub>DDI</sub>=1.65 to 3.3V, V<sub>DD</sub>=2.4 to 3.3V, AGND=DGND=0V, T<sub>a</sub>= -30 to 70°C

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	$T_{AST}$	Address setup time	0		ns	
	$T_{AHT}$	Address hold time (Write/Read)	10		ns	
CSX	$T_{CHW}$	Chip select "H" pulse width	0		ns	
	$T_{CS}$	Chip select setup time (Write)	15		ns	
	$T_{RCS}$	Chip select setup time (Read ID)	45		ns	
	$T_{RCSFM}$	Chip select setup time (Read FM)	355		ns	
	$T_{CSF}$	Chip select wait time (Write/Read)	10		ns	
	$T_{CSH}$	Chip select hold time	10		ns	
WRX	$T_{WC}$	Write cycle	66		ns	
	$T_{WRH}$	Control pulse "H" duration	15		ns	
	$T_{WRL}$	Control pulse "L" duration	15		ns	
RDX (ID)	$T_{RC}$	Read cycle (ID)	160		ns	When read ID data
	$T_{RDH}$	Control pulse "H" duration (ID)	90		ns	
	$T_{RDL}$	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	$T_{RCFM}$	Read cycle (FM)	450		ns	When read from frame memory
	$T_{RDHFM}$	Control pulse "H" duration (FM)	90		ns	
	$T_{RDLFM}$	Control pulse "L" duration (FM)	355		ns	
D[17:0]	$T_{DST}$	Data setup time	10		ns	For CL=30pF
	$T_{DHT}$	Data hold time	10		ns	
	$T_{RAT}$	Read access time (ID)		40	ns	
	$T_{RATFM}$	Read access time (FM)		340	ns	
	$T_{ODH}$	Output disable time	20	80	ns	

Fig 5.5.2 8080 Parallel Interface Characteristics

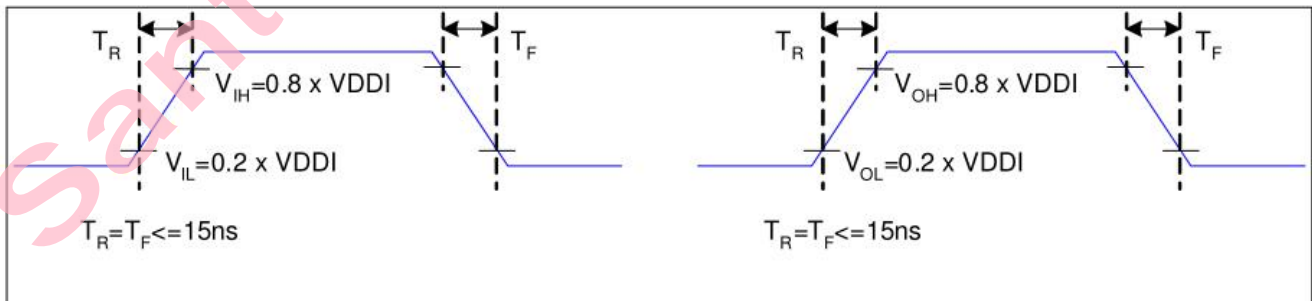
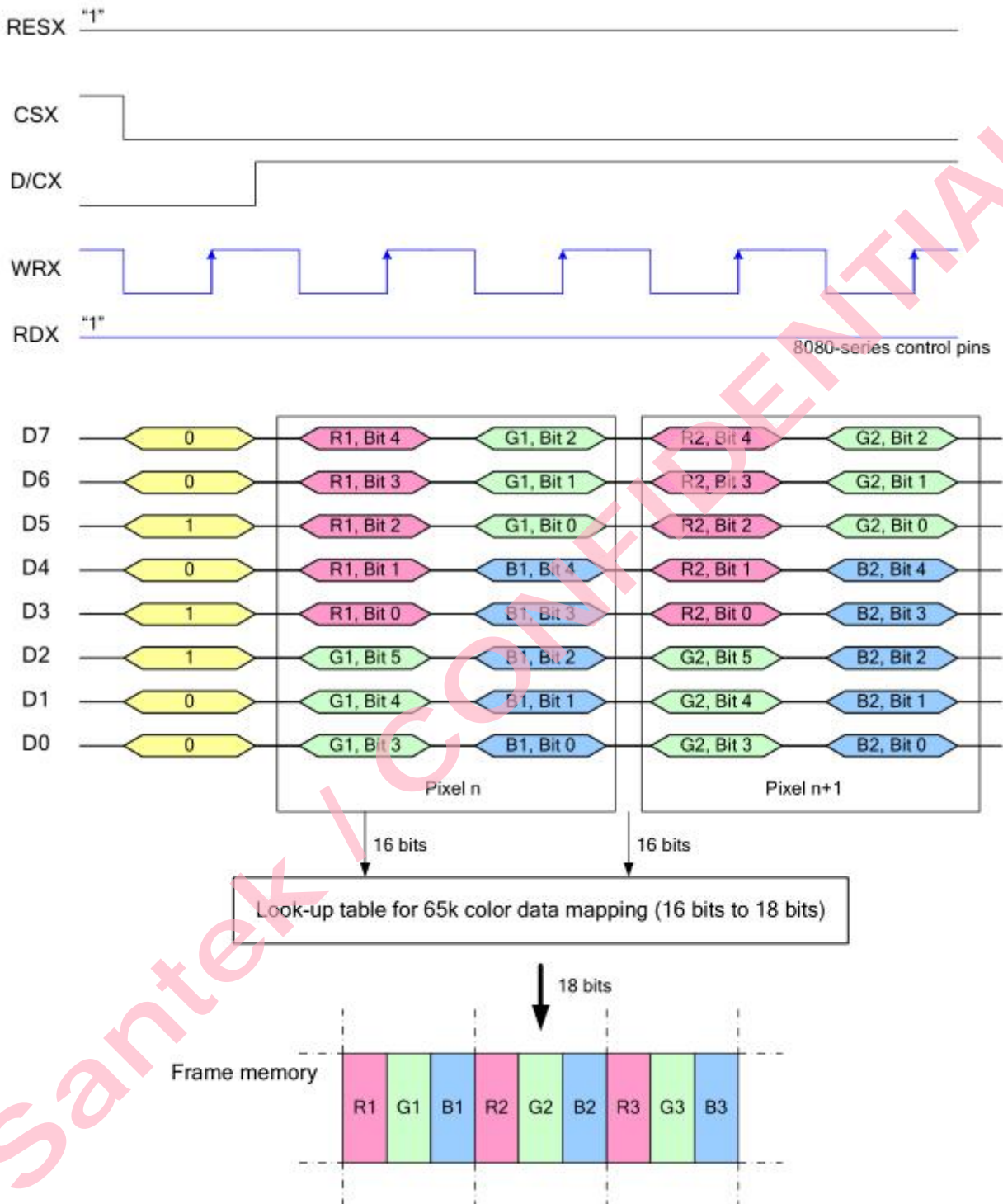


Fig 5.5.3 Rising and Falling Timing for I/O Signal

**Note:** The rising time and falling time ( $T_r$ ,  $T_f$ ) of input signal and fall time are specified at 15 ns or less. Logic high and low levels are specified as 20% and 80% of VDDI for Input signals.

5.5.4 8080-Series 8-Bit Parallel Interface

8-bit data bus for 16-bit/pixel(RGB 5-6-5-bit input), 65K-Colors,3Ah="05h"

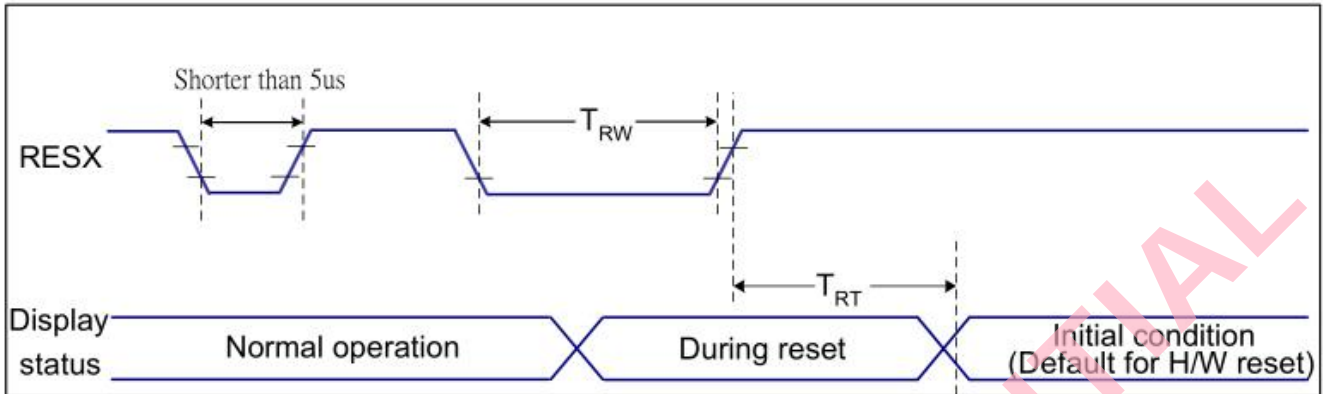


Note 1: The data order is as follows, MSB=D15, LSB=D0 and picture data is MSB=Bit 5, LSB=Bit 0 for Green, and MSB=Bit 4, LSB=Bit 0 for Red and Blue data.

Note 2: 2-times transfer is used to transmit 1 pixel data with the 16-bit color depth information.

Note 3: '-' = Don't care – Can be set to '0' or '1'

5.6. TFT RESET TIMING CHARACTERISTICS



Reset Timing

VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=-30 ~ 70 °C

Related Pins	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

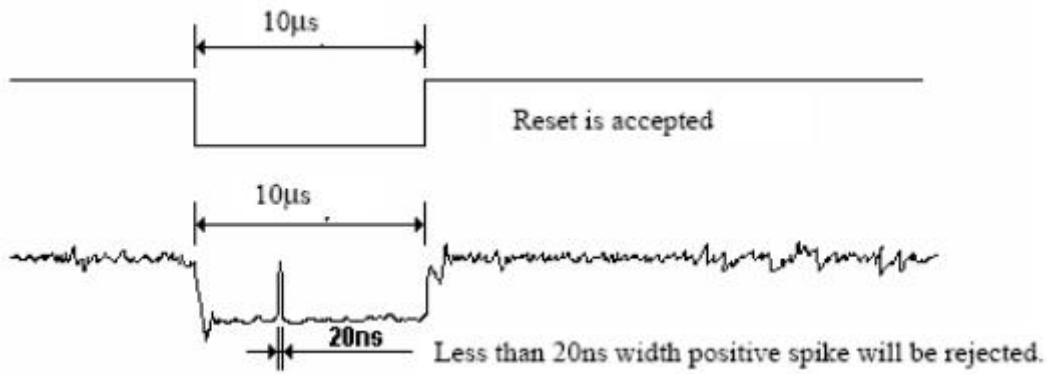
Table Reset Timing

Notes:

- 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 (tRT) within 5 ms after a rising edge of RESX.
- 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 9us	Reset
Between 5us and 9us	Reset starts

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



5. When Reset applied during Sleep In Mode.
6. When Reset applied during Sleep Out Mode.
7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.



6.OPTICAL CHARACTERISTICS

(T<sub>a</sub>=+25°C, V<sub>CI</sub>=+2.85V IOVCC=+1.8V, I<sub>B</sub>=20mA)

Item	Symbol	Condition	Values			Unit	Remark	
			Min.	Typ.	Max.			
Viewing Angle Range	Left	θ <sub>L</sub>	CR ≥ 10	-	80	-	degree	Note 1
	Right	θ <sub>R</sub>		-	80	-		
	Top	Φ <sub>T</sub>		-	80	-		
	Bottom	Φ <sub>B</sub>		-	80	-		
Response Time	T <sub>on</sub> +T <sub>off</sub>	Normal θ=φ=0°	-	30	-	ms	Note 2	
Contrast Ratio	CR	Normal θ=φ=0°	640	800	-	-	Note 3	
Luminance	L	Normal θ=φ=0°	330	450	--	cd/m <sup>2</sup>	Note 4	
Color Chromaticity (CIE1931)	White	X	Normal θ=φ=0°	-0.03	0.296	+0.03	-	Note 5
		Y			0.310			
	Red	X			0.620			
		Y			0.350			
	Green	X			0.320			
		Y			0.590			
	Blue	X			0.140			
		Y			0.070			
Transmittance	Trans		-	4.5%		-	Note7 Normal POL	

Judgement criterion:

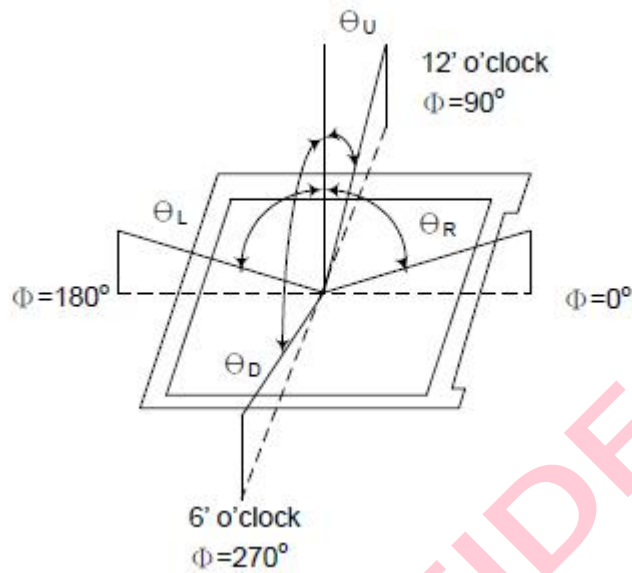
$$\Delta c_{白}' = \sqrt{(\Delta u')^2 + (\Delta v'/1.5)^2} = \sqrt{(u'_{白} - u'_{白0})^2 + [(v'_{白} - v'_{白0})/1.5]^2}$$

the "u'\_{白0}" and "v'\_{白0}" is the type value in the Figure 1.

the error of the Red、Green and Blue must be controlled as follow

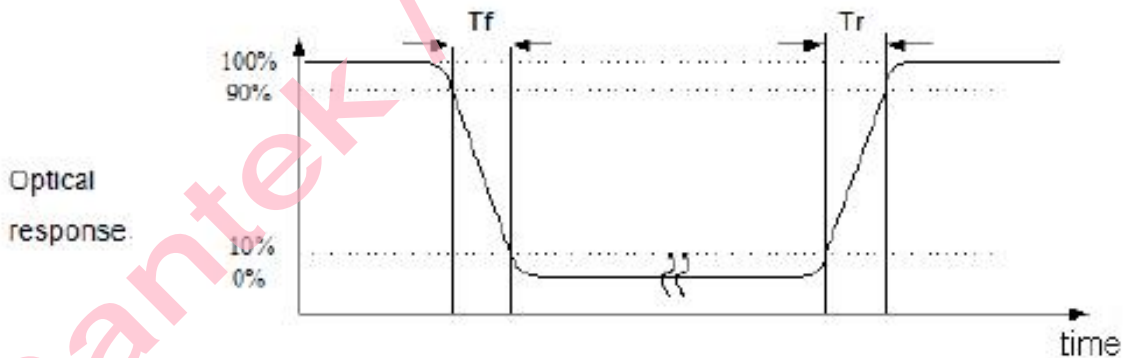
$$\Delta c_{白}' \leq 0.0115, \Delta c_{红}' \leq 0.0230, \Delta c_{绿}' \leq 0.0230, \Delta c_{蓝}' \leq 0.0230。$$

Note 1: Definition of viewing angle range



Note 2: Definition of response time

The output signals of TRD-100 are measured when the input signals are changed to "White" (falling time) and from "White" to "Black" (rising time). respectively. The interval is between the 10% and 90% of amplitudes. Refer to figure as below.



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 4: Definition of luminance

Measured at the center area of the panel when LCD panel is driven at “white” state.

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD when panel is driven at “White”, “Red”, “Green” and “Blue” state respectively.

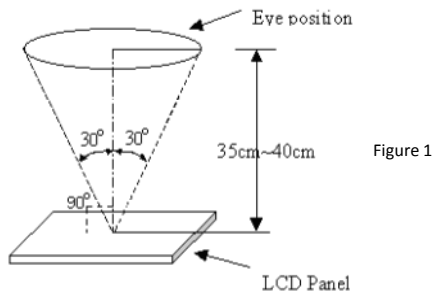
Note 7 : CDY shipping status is cell without polarizer. Transmittance of specification is cell with polarizer.

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## 7.THE STANDARD OF INSPECTION FOR TFT

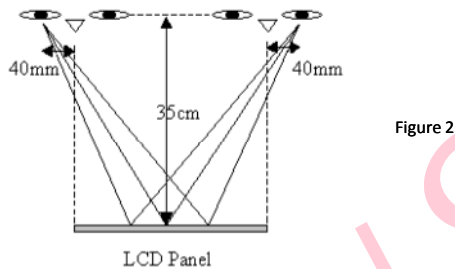
### 7.1 INSPECTION CONDITIONS IS AS FOLLOWS:

- (1) Viewing distance is approximately 30~ 40 cm
- (2) Viewing angle is normal to the LCD panel as Figure 1(30°)
- (3) Ambient temperature is approximately  $25 \pm 5^{\circ}\text{C}$
- (4) Ambient humidity is  $60 \pm 5\% \text{ RH}$
- (5) Ambient luminance is about 700 ~ 1000 Lux under 40W daylight lamp.
- (6) Input signal timing should be typical value.
- (7) Mura & Light leakage inspection at ND-Filter 5%



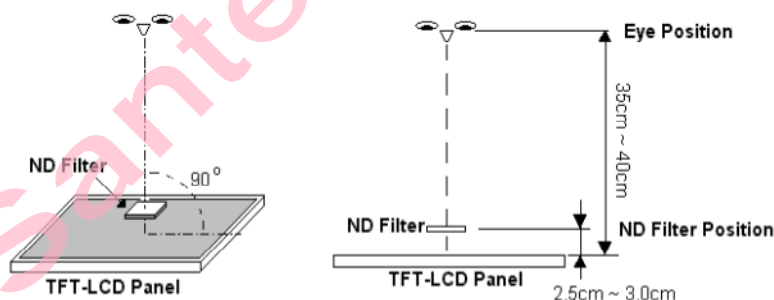
#### Note 1: Special condition

- (1) Viewing distance is close for inspection of adjacent dots and distance between defect dots.
- (2) Viewing condition of "Shot block non-uniformity from oblique angle" is as Figure 2.
- (3) Exceptional case: View angle  $\pm 40^{\circ}$  while inspected image-sticking.

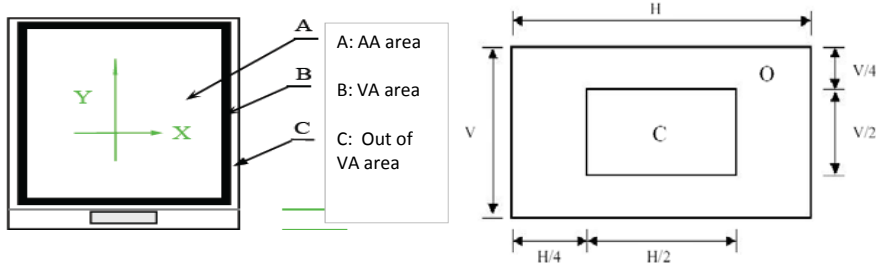


#### Note 2: The definition of bright dot

- (1) The defective area of the dot is larger than 50% of one sub-pixel area.
- (2) The bright dot shall be visible under ND-Filter 5% as following.

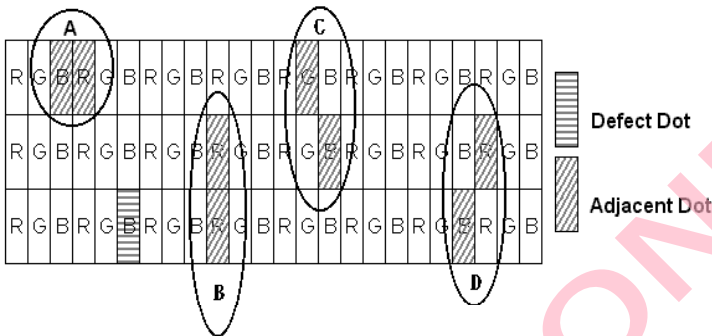


**Note 3: Definition of AA, VA and Out of VA**



**Note 4: Judgment for defect and adjacent dots in display:**

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.



**Note 5: Other condition**

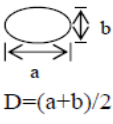
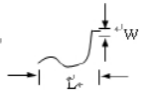
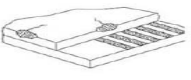
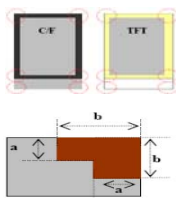



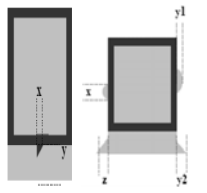
- (1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.
- (2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

**7.2 SAMPLING PLAN/ALLOWED STANDARD IN INSPECTION:**

**MIL-STD-105E, SAMPLING PLAN: LEVEL II:**


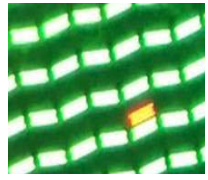

- AQL 0.65 ----- Display inspection
- AQL 1.0 ----- Appearance inspection

7.3 APPEARANCE INSPECTION:

No.	Defect items	Photos	Tools	Standards			Judge	Remark
				Dimension(mm)	AA/VA area	Out of VA		
1	Foreign matter/ Black/White/Bright Spot/ Polarizer Dent/Polarizer Bubbles	 <p><math>D=(a+b)/2</math></p>	Film gauge	$D \leq 0.15$	Ignore (Not gathered)	Ignore (Not gathered)	OK	D=diameter L=length W=width T=thickness
				$0.15 \leq D \leq 0.25$	$N \leq 2$		OK	
				$0.25 \leq D \leq 0.3$ Distance $\geq 20$	$N \leq 1$		OK	
				$D > 0.3$	Not accepted		NG	
2	Foreign matter/ Black/White/Bright Line Polarizer Scratches		Film gauge	$W \leq 0.05$	Ignore (Not gathered)	Ignore	OK	
				$0.05 \leq W \leq 0.1$ $L \leq 2$	$N \leq 3$		OK	
				$W > 0.1$	Follow spec of dot defects		NG	
3	Class crack		Naked eyes	Any extended crack is not accepted			NG	
4	Corner chipping		Naked eyes Film gauge	$a \leq 2\text{mm}, b \leq 4\text{mm}, t < T$ $a \leq 1\text{mm}, b \leq 2\text{mm}, t = T$			OK	
5	Corner chipping at class		Naked eyes Film gauge	$a < 1\text{mm}$ ignore $W, t < T$ $1 \leq a \leq 2\text{mm}$ or $w \leq 4\text{mm}, t < T$ $a \leq 1\text{mm}$ or $w \leq 4\text{mm}, t = T$			OK	
6	Chipping on contacting pads		Naked eyes Film gauge	$a \leq 1\text{mm}$ ignore $W, t \leq T$ (On the contact pin) $a \leq 1\text{mm}, w \leq 4\text{mm}, t = T$ (Outside of the contact pin)			OK	Basically, it mustn't affect the function of product
7	Chipping on rear side of glass		Naked eyes Film gauge	$a < 1\text{mm}$ ignore $W, t < T$ $1 \leq a \leq 2\text{mm}$ or $w \leq 4\text{mm}, t < T$ $a \leq 1\text{mm}$ or $w \leq 4\text{mm}, t = T$			OK	
8	Cutting residue out of glass edge		Naked eyes Film gauge	If it doesn't affect assembly or operation, follow the spec below: $X$ ignore, $Y2 \leq 0.5\text{mm}, Y2 + Z \leq 0.5$			OK	
9	Stain on surface		Naked eyes	Stain that is removable by soft cloth or air blow is acceptable, it doesn't affect production characteristic			OK	

No.	Defect items	Photos	Tools	Standards			Judge	Remark
				Dimension(mm)	AA/VA area	Out of VA		
10	Any dirt or scratch or bubbles or any defects on protective film		Naked eyes	Ignore if it doesn't affect the product			OK	
11	FPC		Naked eyes	The folding trace is visible but it doesn't affect circuit connection			OK	
				Not allowed to have oxidation, copper exposed and scratches with copper exposed at golden finger			NG	
				There is scratch visibly but no copper exposed			OK	
				Any scratches or testing trace on gold fingers, if they don't affect the function, they are acceptable			OK	
				Dirty on the gold fingers			NG	
12	Color / Printing color Front view side		Naked eyes, Color meter, Pantone standard	a. Control with color meter, Spec of $\Delta E \leq 3$ ; b. If the area is smaller than 10mm <sup>2</sup> , cannot use color meter, we use naked eyes and judge color under light box.			OK	
13	B/L Metal frame		Naked eyes	Surface scratches doesn't expose base material, just ignore			OK	
				Deformation and affect the assembly			NG	
				Clips are loose and affect assembly			NG	

7.4 DISPLAY INSPECTION:

No.	Defect items	Photos	Tools	Standards			Judge	Remark	
				Dimension(mm)	AA/VA area	Out of VA			
1	Circular defects Foreign matter/ black dots/ bubbles and etc		Naked eyes	$D \leq 0.15$	Ignore (Not gathered)	Ignore (Not gathered)	OK	Use microscope to identify the defects if necessary  1 pixel = 3 sub-pixel, RGB, 1 sub-pixel is called 1 dot.	
				$0.15 \leq D \leq 0.25$	$N \leq 2$		OK		
				$0.25 \leq D \leq 0.3$ Distance $\geq 20$	$N \leq 1$		OK		
				$D > 0.3$	Not accepted		NG		
2	Pixel spot bright dot		Naked eyes	$D \leq 1/2$ dot	Ignore	distance $\geq$	OK		
				$D > 1/2$ dot	$N \leq 2$		2dots		OK
					$N \leq 1$		3dots		OK
					$N \leq 0$		Total $N \leq 3$		OK
3	Pixel spot dark dots		Naked eyes	$D \leq 1/2$ dot	Ignore	distance $\geq$	OK		
				$D > 1/2$ dot	$N \leq 2$		2dots		OK
					$N \leq 0$		3dots	OK	
					$N \leq 0$		Total $N \leq 3$	OK	
4	Linear defects Black/White Line/ fibers		Naked eyes Film gauge	$W \leq 0.05$	Ignore (Not gathered)	Ignore	OK		
				$0.05 \leq W \leq 0.1$ $L \leq 2$	$N \leq 3$		OK		
				$W > 0.1$	Follow spec of dot defects		NG		
5	MURA white/black spot and other visible vague defects		Naked eyes 5% ND filter	Mura is invisible with 5% ND filter			OK		
				Visible with 5% ND filter			NG		
6	Uneven color when display in grey/black or TFT off conditions		Naked eyes 5% ND filter	This situation is always happening at VA edge, it only happens in Grey/Black or TFT off conditions, if it is invisible in RGB or other color photos, OK. otherwise, NG			OK		
7	Light leakage from Backlight		Naked eyes	Viewing from topside view (0 degree), Light leakage happens out of VA area, or invisible			OK		
				Viewing from topside view (0 degree), Light leakage happens inside VA area			NG		
8	Abnormal color		Naked eyes	Not accepted			NG		
9	No display		Naked eyes / Under 40W	Not accepted			NG		
10	Irregular display			Not accepted			NG		
11	Missing line			Not accepted			NG		
12	Short circuit			Not accepted			NG		
13	Flicker			Not accepted			NG		
				Not accepted			NG		



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**7.5 MECHANICAL:**

- (1) Don't disassemble and reassemble the module by self.
- (2) Acid, alkali, alcohol or touched directly by hand will damage the display.
- (3) Static electricity will damage the module. Please configure grounding device.
- (4) The strong vibration, shock, twist or bend will cause material damage, even module broken.
- (5) It is easy to cause image sticking while displaying the same pattern for very long time.
- (6) The response time, brightness and performance will vary from different temperature.
- (7) LCD Devices are made of fragile material such as Glass and may be broken or cracked if dropped it, so please handle them with care. Please be careful not to cut your hand if you break the glass.
- (8) Do not stack the LCDs to avoid the LCDs damage and contamination.
- (9) Before using the LCDs, please check the specification.
- (10) LCDs contain a small amount of Liquid Crystal. Please follow local ordinances or regulations for disposal.
- (11) LCD shall be stored in same packing material during import, and under the condition of room temperature (20-30 degree C).
- (12) Please do not leave LCD modules under the direct sunlight or strong infra-red radiation for a long period time to prevent liquid crystal deteriorating.
- (13) Please turn off the power supply before plugging or unplugging LCD module.
- (14) Please do not rub, push, or hit LCD surface with hard tool etc. Film on surface is easily scratched, when droplets of water or dirt are on the surface, please gently remove them with soft fabric.
- (15) Handling of main and LED FPC (Flexible Printed Circuit), please be careful, do not strongly pull or scratch FPC, to avoid failure of the components and bonding part.

**8.RELIABILITY TESTS**

<b>ITEM</b>	<b>CONDITION</b>	<b>CRITERION</b>
Operating Temperature Test	High Temperature: +70 °C, 96 hrs	No defects in display and operational functions
	Low Temperature: -20 °C,96 hrs	
Storage Temperature Test	High Temperature: +80 °C, 96 hrs	No defects in display and operational functions
	Low Temperature: -30 °C, 96 hrs	
Humidity Endurance Test	60°C, 90%RH, 96 hrs	No defects in display and operational functions
Thermal Shock Test	-20 °C (30mins) ~ +70 °C (30mins) 10 cycles	No defects in display and operational functions
Electro Static Discharge	± 4KV, Human BodyMode,150pF/330Ω; ± 8KV,Air Mode,150pF/330Ω	No defects in display and operational functions

**NOTE:**

- 1) The samples must be free from defect before test, must be restored at room condition at least for 2 hours after reliability test before any inspection.
- 2) Before test the function of TP, the sample must be placed in room temperature for 24hrs after RA test.

**9. PRECAUTIONS**

**9.1. HANDLING**

- 10.1.1. Polarizer Cleaning, Petroleum ether (or N-hexane) is recommended for cleaning the front/rear polarizers and reflectors, acetone, toluene and ethanol are not allowed to avoid damaging the surface.
- 10.1.2. Body grounding, must wear Anti-ESD wrist strap while pick up LCDs.
- 10.1.3. FPC Soldering, less than 300°C/3S, solder must be grounding on grounding bench.
- 10.1.4. If use electric Screwdriver to do assembly, screwdriver must be grounding.

**9.2. STORAGE**

- 11.2.1. Keep in a sealed polyethylene bag.
- 11.2.2. Keep in a dark place.
- 11.2.3. Keep in temperature between 0°C and 35°C.  
Not allowed at 70°C for more than 160 Hours, or at -20°C for more than 48 Hrs.

**9.3. SAFETY**

If liquid crystal leak out of a damaged glass cell, Do not put it in your mouth or touch eyes, if the liquid crystal touch your skin or clothes, please wash it off immediately using soap and water.

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**10. LIMITED WARRANTY**

Unless otherwise agreed between Superview and customer, Superview will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with Superview LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/visual defects over specs must be returned to Superview within 30 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of Superview limited to repair and/or replacement on the terms set forth above. Superview shall not be responsible for any subsequent or consequential events.

**10.1. RETURNING LCM UNDER WARRANTY – TERMS AND CONDITIONS**

10.1.1. No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- Circuit modified in any way, including addition of components.

10.1.2. Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB's eyelet, conductors and terminals.