盛世创业光电科技有限公司

SPECIFICATION

Version: A

Product Model: QST2D6031-T

Designed by	R&D Checked by	Quality Department by	Approved by
luochuan			

Approval by Customer

OK

NG，Problem survey:

Approved By _____

1. If there is no special request from customer, quality Co.,ltd. Will not reserve the tooling of the product under the following conditions:
   1.1 There is no response from customer in one year after quality Co.,ltd. Submit the samples;
   1.2 There is no order in one year after the latest mass production.
2. All correlated data (include quality record) will be reserved one year more after tooling was discarded.
3. If there is no special request from customer, The product of quality Co,. ltd. Will repair only one year.

Revision Record

VEV NO.	REV DATE	CONTENTS	Note
A	2009-01-08	NEW ISSUE	

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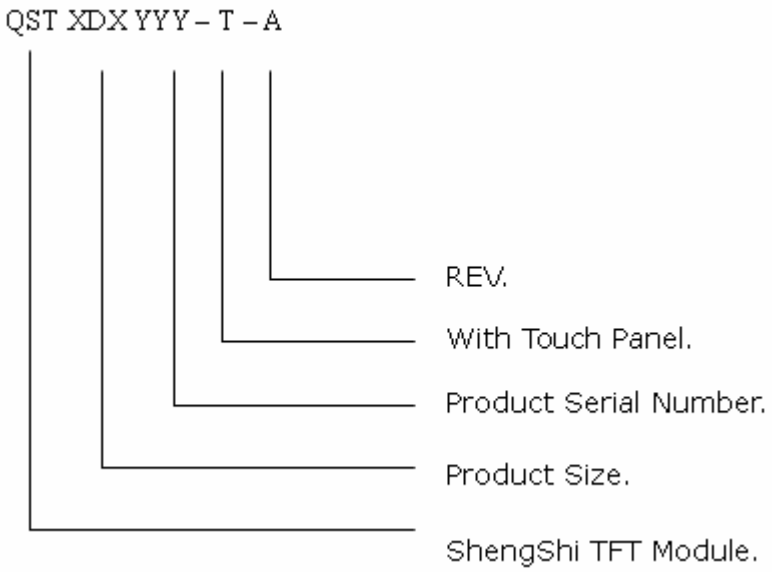
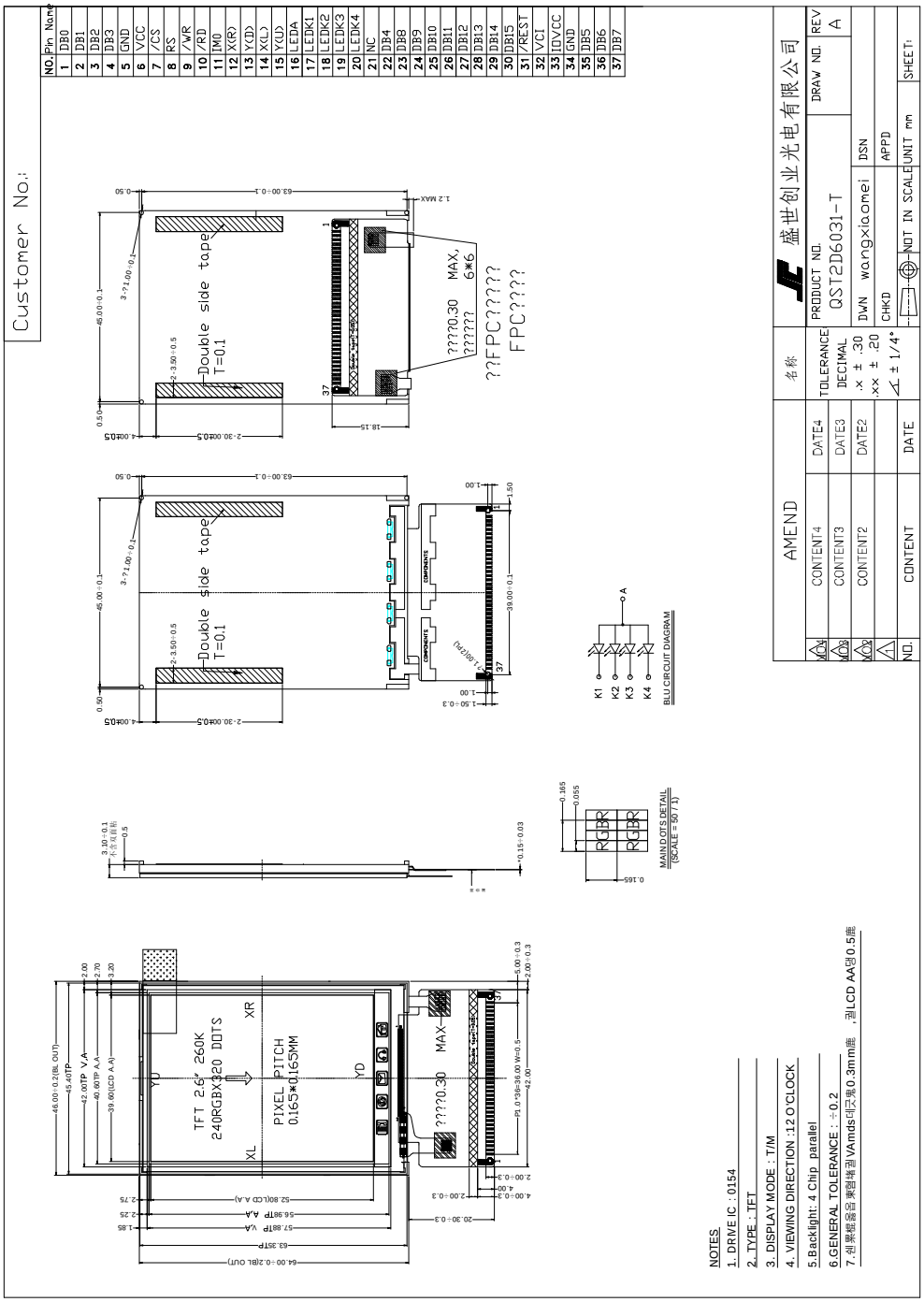
1. Numbering System



2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	2.6”TFT	--
Dot arrangement	240（RGB）×320	dots
Driver IC	S6D0154	--
Module size	46.00(W) ×64.00(H)×3.10(T)	mm
Active area	39.60(W) ×52.80(H)	mm
Dot pitch	0.165(H) x 0.165(V)	mm
Operating temperature	-20 ～ +70	℃
Storage temperature	-30 ～ +80	℃
Back Light	4 White LED In Parallel	--
Weight	TBD	g

3. External Dimensions



4. Interface Description

PIN NO.	PIN NAME	DESCRIPTION
1	DB0	Data Bus
2	DB1	Data Bus
3	DB2	Data Bus
4	DB3	Data Bus
5	GND	System ground
6	VCC	Power supply for the internal logic circuit (+2.8V)
7	/CS	Chip select signal, Active “L”
8	RS	Command / Display data selection 0: command; 1: display data
9	/WR	Write signal input, Active” L ”
10	/RD	Read signal input, Active” L ”
11	IM0	No Connect
12	X(R)	Touch Panel control pin
13	Y(D)	Touch Panel control pin
14	X(L)	Touch Panel control pin
15	Y(U)	Touch Panel control pin
16	LED_A	Power supply for LED backlight Anode input
17	LED_K1	Power supply for LED backlight Cathode input
18	LED_K2	Power supply for LED backlight Cathode input
19	LED_K3	Power supply for LED backlight Cathode input
20	LED_K4	Power supply for LED backlight Cathode input
21	NC	No Connect
22	DB4	Data Bus
23	DB8	Data Bus
24	DB9	Data Bus
25	DB10	Data Bus
26	DB11	Data Bus
27	DB12	Data Bus
28	DB13	Data Bus
29	DB14	Data Bus
30	DB15	Data Bus
31	/RESET	Reset input pin, When reset is “L”, Initialization is executed.
32	VCI	Power supply for the internal logic circuit (+2.8V)
33	IOVCC	System Power Supply
34	GND	System ground
35	DB5	Data Bus
36	DB6	Data Bus
37	DB7	Data Bus

5.Absolute Maximum Ratings.

Item	Symbol	Rating	Unit
Supply voltage for logic block	VDD - VSS	-0.3 to +3.3	V
Supply voltage for I/O block	VDD3 - VSS	-0.3 to +5.0	V
Supply voltage for step-up circuit	VCI - VSS	-0.3 to +5.0	V
LCD Supply Voltage range	AVDD – VSS	-0.3 to +6.5	V
	VGH - VSS	-0.3 to +22.0	V
	VSS – VGL	-0.3 to +22.0	V
	VSS - VCL	-0.3 to +5.0	V
	|VGH – VGL|	-0.3 to +33	V
Input Voltage range	Vin	- 0.3 to VDD3 + 0.5	V
Operating temperature	Topr	-40 to +85	°C
Storage temperature	Tstg	-55 to +110	°C

Note.

1. Absolute maximum rating is the limit value. When the IC is exposed operating environment beyond this range, the IC is not guaranteed for the normal operations and may be damaged permanently, not be able to be recovered.
2. Operating temperature means the possible range of device-operating temperature. It does not mean that the performance of the driver IC would be guaranteed over this temperature range.
3. Absolute maximum rating is guaranteed only when our company's package used.

6. DC Characteristics.

Characteristic	Symbol	CONDITION	MIN	TYP	MAX	Unit	Note
Operating voltage	VDD3		1.65	-	3.3	V	*1
LCD driving voltage	VGH		11.25	-	16.50	V	*2
	VGL		-13.75	-	-6.75	V	*2
	VCL		-3	-	-2.25	V	*3
	AVDD		4.5	-	6.0	V	*3
	GVDD		2.5	-	5.0	V	
Input high voltage	V_{IH}		0.7*VDD3	-	VDD3	V	*4
Input low voltage	V_{IL}		0	-	0.3*VDD3	V	*4
Output high voltage	V_{OH}	I_{OH} = -0.5mA	0.8*VDD3	-	VDD3	V	*5
Output low voltage	V_{OL}	I_{OL} = 0.5mA	0.0	-	0.2*VDD3	V	*5
Input leakage current	I_{IL}	VIN = VSS or VDD3	-1.0		1.0	uA	*4
Output leakage current	I_{OL}	VIN = VSS or VDD3	-3.0		3.0	uA	*5
Operating frequency	Fosc	Frame freq. = 60 Hz Display line = 320	0.9*TYP	323	1.1*TYP	kHz	*6
Internal reference power supply voltage	VCI		2.5	-	3.3	V	
1st step-up input voltage	VCI1		1.35	-	3	V	
1st step-up output efficiency	η_{AVDD}	ILOAD = 4 mA	90	95	-	%	
2nd step-up output efficiency	η_{VGH}	ILOAD = 0.1 mA	90	95	-	%	
3rd step-up output efficiency	η_{VGL}	ILOAD = 0.1 mA	90	95	-	%	
4th step-up output efficiency	η_{VCL}	ILOAD = 0.3 mA	90	95	-	%	

Note.

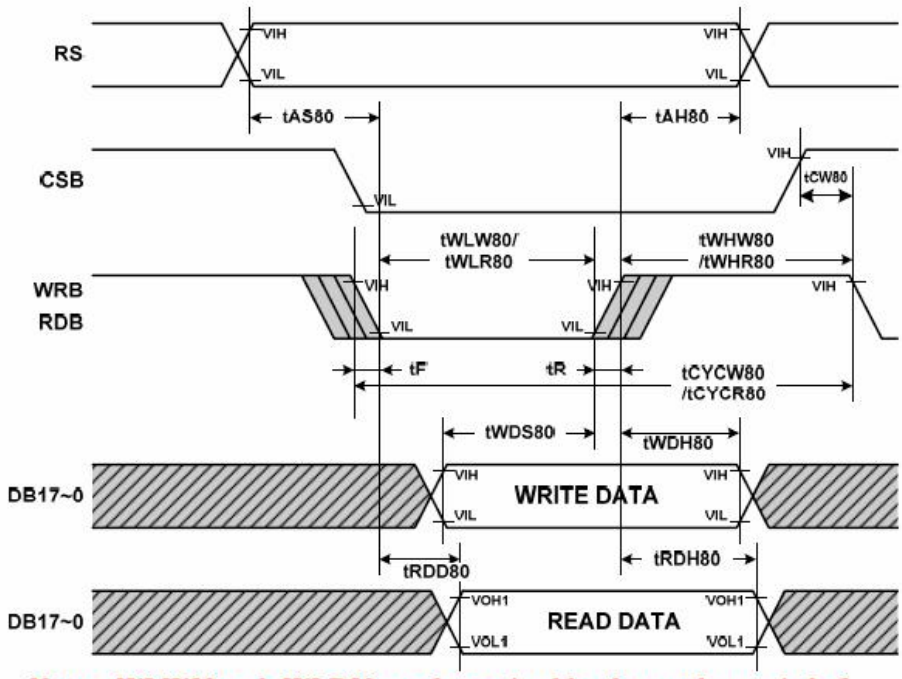
1. VSS = 0V.
2. |VGH| & |VGL| Min : When VCI1 = 2.25V, |VGL| Max : When VCI1=2.75V, |VGH - VGL| Max : 30.0V
   cf> |VGH| max. should be lower than or equal to 16.5V in normal operating condition, regardless of VCI1 & BT settings.
3. AVDD & |VCL| Min: When VCI1 = 2.25V, AVDD & |VCL| Max: When VCI1=3.0V
4. Applied pads; CSB, E_RDB, RW_WRB, RS, DB[17:0], RESETB, HSYNC, VSYNC, DOTCLK, ENABLE, SDI, EXCLK
5. Applied pads; DB[17:0], M, FLM, CL1, SDO
6. Target frame frequency : 60 Hz, Display line = 320, Back porch = 8, Front porch = 8, RTN2-0 = "000"
   cf> Fosc can be observed indirectly by measuring CL1 pad.(fosc / 16)

7.Timing Characteristics.

7.1 AC Characteristics

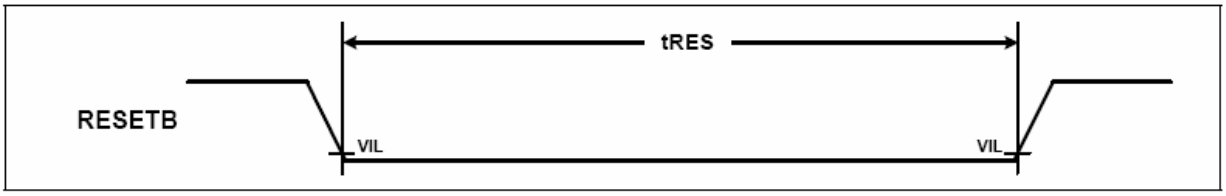
(VDD = 1.5V, VDD3 = 1.65 to 3.3V, TA = -40 to +85°C)

Characteristic		Symbol	Specification		Unit
			Min.	Max.	
Cycle time	Write	tCYCW80	100	–	ns
	Read	tCYCR80	500	-	
Pulse rise / fall time		tR, tF	-	15	
Pulse width low	Write	tWLW80	33	–	
	Read	tWLR80	250	-	
Pulse width high	Write	tWHW80	33	–	
	Read	tWHR80	250	-	
RS to CSB, WRB(RDB) setup time		tAS80	10	-	
RS to CSB, WRB(RDB) hold time		tAH80	2	-	
CSB to WRB(RDB) time		tCW80	15	-	
Write data setup time		tWDS80	20	-	
Write data hold time		tWDH80	10	-	
Read data delay time		tRDD80	-	200	
Read data hold time		tRDH80	10	-	



Note : tWLW80 and tWLR80 are determined by the overlap period of low CSB and low WRB or low CSB and low RDB

7.2 Reset Input Timing

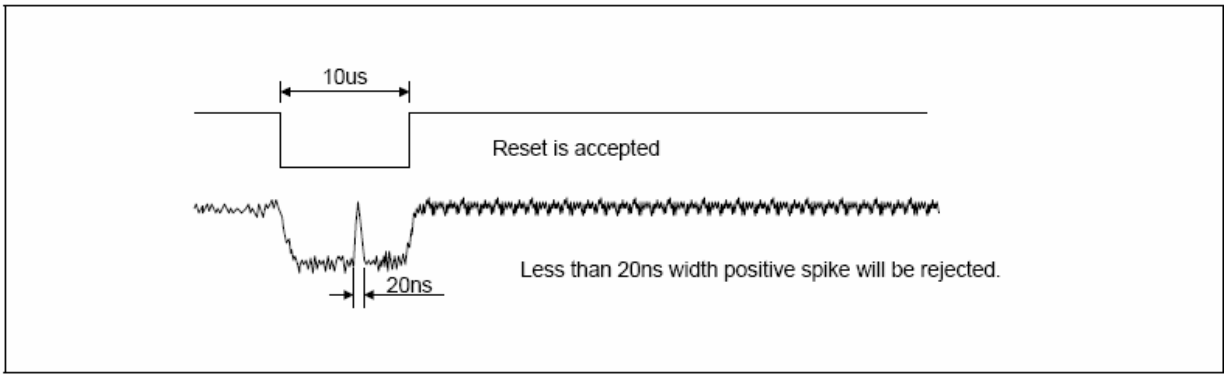


Note. Reset low pulse width shorter than 10us do not make reset. It means undesired short pulse such as glitch, bouncing noise or electrostatic discharge do not cause irregular system reset. Please refer to the table below.

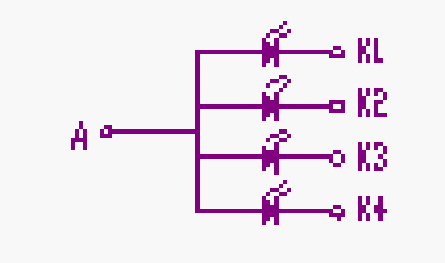
Parameter	Description	Min	Max	Unit
tRES	Reset low pulse width	10	-	us

tRES Pulse	Action
Shorter than 5 us	No reset
Longer than 10 us	Reset
Between 5 us and 10 us	Not determined

1. User may or may not use RESETB pin. In order to use it, user should satisfy the conditions described in the above tables. But when not wants to use RESETB, user may fix this pin to VDD3 level because internally generated POR (Power-On-Reset) is used.
2. Spike Rejection also applies during a valid reset pulse as shown below:



8. BackLight Characsterics:



Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	**Vf**	**3.0**	**3.2**	**3.4**	**V**	**If=60 mA**	**-**
Supply Current	**If**	**-**	**60**	**-**	**mA**	**-**	**-**
Reverse Voltage	**Vr**	**-**	**-**	**5**	**V**	**10uA**	
Power dissipation	**Pd**	**-**	**140**	**-**	**mW**	**-**	
Luminous Intensity for LCM		-	**180**	-	**Cd/m^2**	**If=60 mA**	
Uniformity for LCM	**-**	**80**	**-**	**-**	%	**If=60 mA**	
Life Time	**-**	**50000**	**-**	**-**	**Hr**	**If=60 mA**	**-**
Backlight Color	**White**						

9.Optical Characteristics

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25 °C. The values specified are at an approximate distance 50cm from the TFT-LCD surface at a viewing angle of Φ and θ equal to 0 °.

Measurement condition: Refer to next pages (C-light source, Halogen Lamp)

*1): with Polarizer
*2): without Polarizer
*3): Only Color Filter glass

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
*1) Threshold Voltage	Vsat	1.90	2.15	2.40	V	Fig.2
	Vth	0.90	1.10	1.30	V	
*2) Transmittance	T(%)	-	16.5	-	%	Fig.1
*1) Contrast Ratio	C/R	300	350	-		
*1) Response Time	Tr+Tf	-	25	40	msec	Fig.3
*3) CIE Color Coordinate	Rx		0.651		-	
	Ry		0.332		-	
	Gx		0.301		-	
	Gy		0.585		-	
	Bx		0.133		-	
	By		0.136		-	
	Wx		0.309		-	
	Wy		0.344		-	
*1) Viewing Angle	Θl	-	45	-	Degree	C/R>10 Fig.4
	Θr	-	45	-		
	Θu	-	35	-		
	Θd	-	15	-		

Notes : 1. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the center point across the TFT-LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.

3. Response time is the time required for the display to transition from white to black(Rise Time, Tr) and from black to white(Falling Time, Tf). For additional information see FIG 3.

4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the TFT-LCD surface. For more information see FIG 5.

5. Optimum contrast is obtained by adjusting the TFT-LCD Threshold voltage(Vth & Vsat)

FIG. 1 Optical Characteristic Measurement Equipment and Method

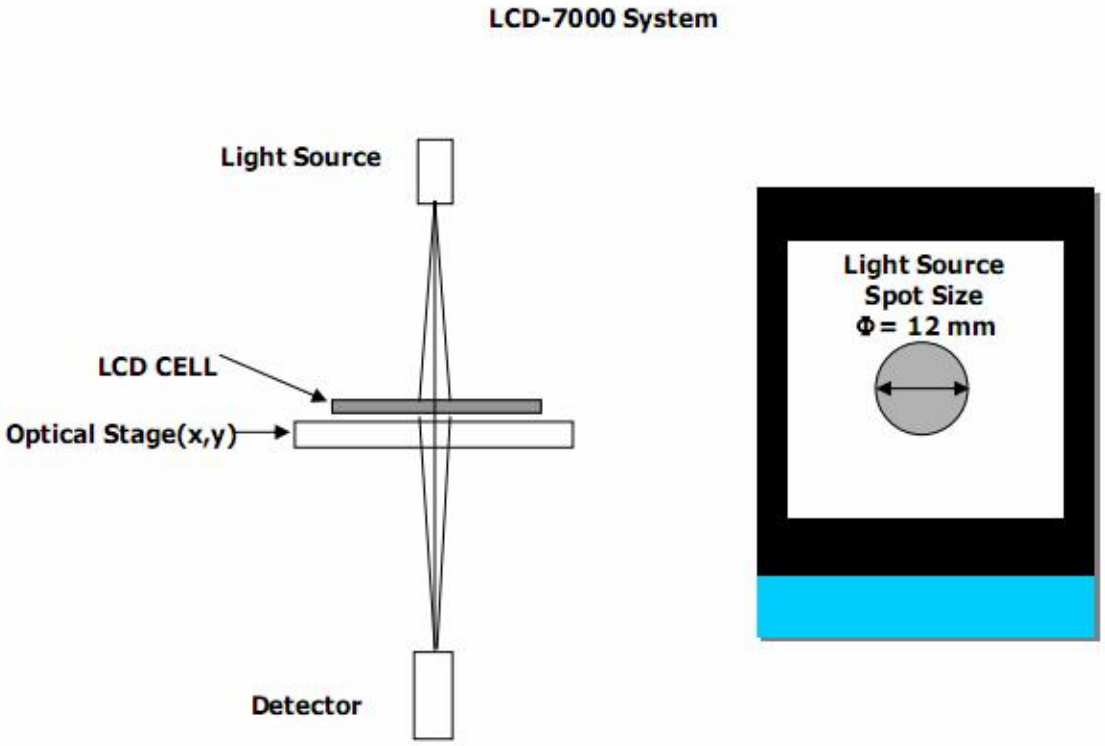


FIG. 2 The definition of Vth and Vsat

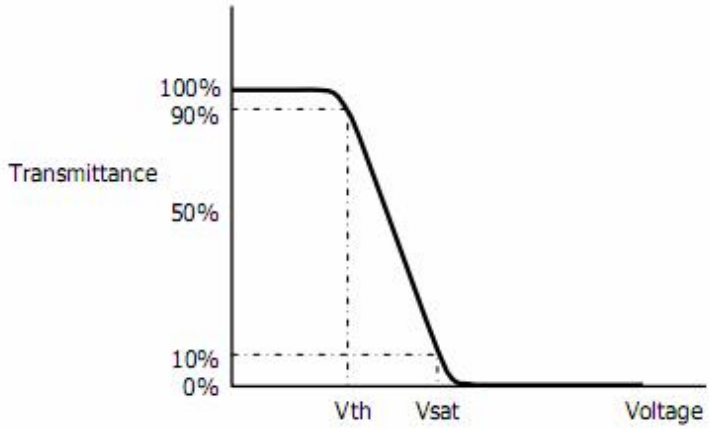
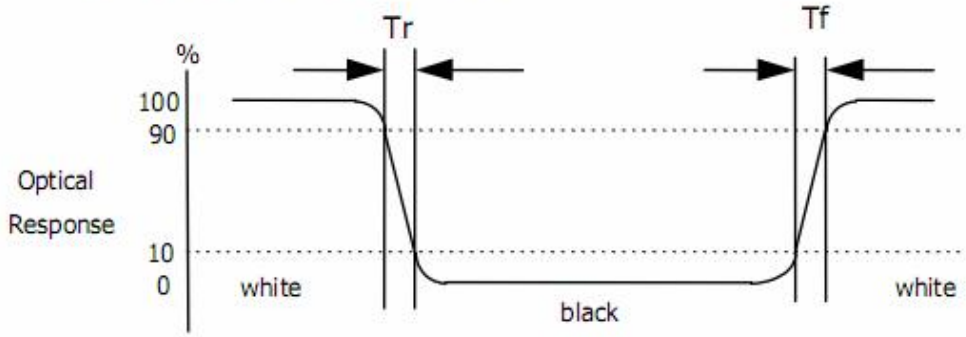


FIG. 3 The definition of Response Time

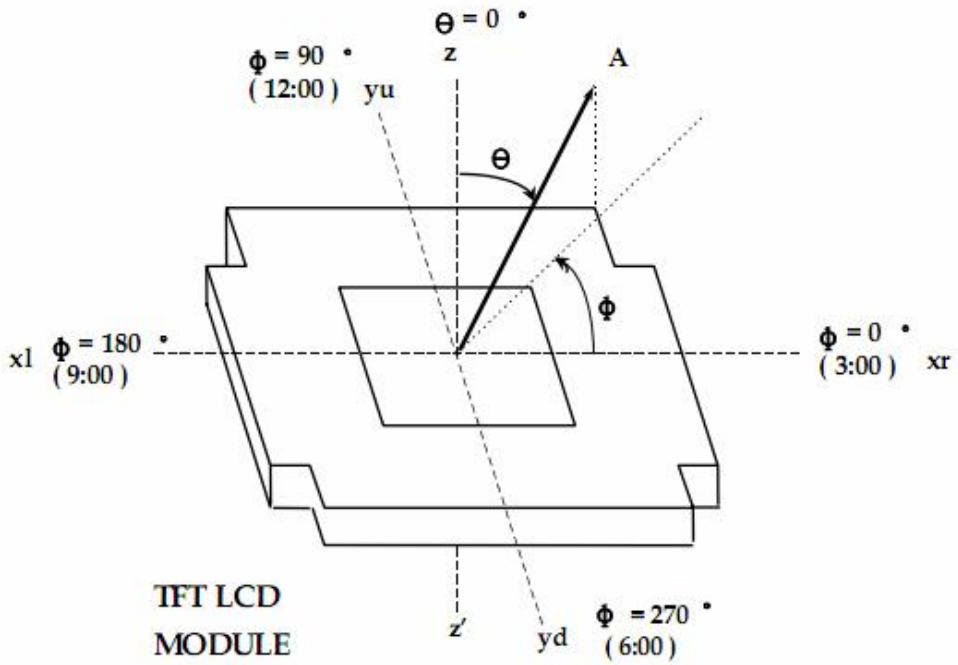
The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".



* Voltage conditions for Response time
Vgate : 19V DC
Vdata : 0V~3.3V DC
Vcom : 0V (Ground)

FIG. 4 The definition of viewing angle

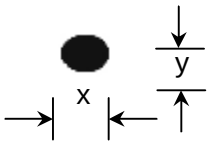
<dimension of viewing angle range>

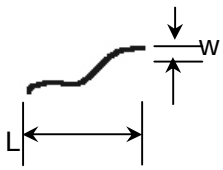


10. Reliability Test Conditions And Methods

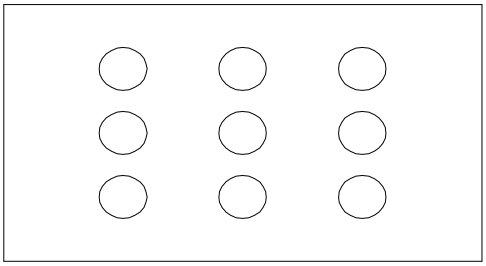
NO	Item	Condition	Method
1	High / Low Temperature Storage	60℃/-20℃ 500hrs	Check and record every 96Hrs
2	High / Low Temperature Life	50℃/-10℃ 500hrs (operating mode)	Check and record every 96Hrs
3	High Temperature、High Humidity Operating	40℃ 90% RH, 120Hrs	Check and record every 48hrs
4	Thermal Shock	-30℃(30Min) ⟶ 25℃(5Min) ⟶ 80℃(30Min) (conversion time, : 5 sec) 20 cycles	Each 10 cycles end , check
5	Vibration	10Hz~55Hz~10Hz Amplitude: 1.5mm 2hrs for each direction(X,Y,Z)	Each direction end, Check the Appearance and Electrical Characteristics
6	Static Electricity	Gap mood: ±1KV~±8KV (10 times air discharge with positive/negative voltage voltage gap : 1kv) Touch mood: ±1KV~±2KV	Each discharge end, Check the Electrical Characteristics
7	Slump	Free faller movement for each side、cording、angle (75cm High、 6 sides、2 angle、2 cording)	End

11.Inspection Standard

<table>
<tr><td>No</td><td>Item</td><td>Criterion</td><td></td></tr>
<tr><td>01</td><td>Outline Dimension</td><td>In accord with drawing</td><td></td></tr>
<tr><td>02</td><td>Position-finding Dimension Assemble Dimension</td><td>In accord with drawing</td><td></td></tr>
<tr><td rowspan="2">03</td><td rowspan="2">LCD black spots, white spots (Round type)</td><td>Round type: non display
 

Unit : mm
<table><tr><td>Dimension</td><td>Qualified Quantity</td></tr><tr><td>D≤0.1</td><td>Ignore</td></tr><tr><td>0.1＜D≤0.15</td><td>3</td></tr><tr><td>0.15＜D≤0.25</td><td>2</td></tr><tr><td>D＞0.25</td><td>0</td></tr></table></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="2">04</td><td rowspan="2">LCD black spots, white spots (Line Style)</td><td> 

Unit : mm
<table><tr><td>Length</td><td>Width</td><td>Qualified Quantity</td></tr><tr><td>-</td><td>≤0.02</td><td>Ignore</td></tr><tr><td>≤3</td><td rowspan="2">0.02＜W≤0.03</td><td>2</td></tr><tr><td></td><td></td></tr><tr><td>≤2</td><td>0.03＜W≤0.05</td><td>1</td></tr><tr><td>-</td><td>D＞0.05</td><td>According to circle</td></tr></table></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>05</td><td>LCD Scratch 、Threadlike Fiber</td><td>Same to NO.3 circle
sightline and surface of LCD is vertical
(2)Same to NO.3 line style</td><td></td></tr>
</table>

06	POL	It is not admissible that POL is beyond the edge of glass, else, unqualified. It is essential that POL is over the 50 percent of width of frame , else ,unqualified. According to the drawing in case of special definition.		
07	Brightness	In accord with product specification	Drive condition is according to specification Measure location is in Follow Picture 3、Adjust brightness instrument tozero , burrow against the surface of LCD , press “measure” , record when the display is steady. (YOKOGAWA-3298)  Measure location	
08	CR (Max)	According to specification	According to product specification Measure instrument (DMS-501)	
09	Response time	According to specification	According to product specification Measure instrument (DMS-501)	
10	Viewing angle	According to specification	According to product specification Measure instrument (DMS-501)	
11	Vibration、Ring	Compare with the sample customer supply	Compare with the sample customer supply when assemble	

12. Handling Precautions

12.1 Mounting method

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

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly

- Isopropyl alcohol
- Ethyl alcohol

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

Do not use the following solvent:

- Water

- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns
Do not use the following solvent on the pad or prevent it from being contaminated:

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

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

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

12.3 Caution against static charge

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

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

12.4 packing

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

12.5 Caution for operation

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

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

12.6 storage

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

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.

[It is recommended to store them as they have been contained in the inner container at the time of delivery from us

12.7 Safety

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

13. Precaution For Use

13.1

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

13.2

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

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

14 Packing Method

To Be Determined