



## SPECIFICATIONS

**CUSTOMER** : \_\_\_\_\_  
**SAMPLE CODE** : **GFCS015BA128128**  
**DRAWIG NO.** : \_\_\_\_\_  
**DATE** : **2007.07.07**

Customer Sign	Sales Sign	Approved By	Prepared By





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Packaging

Note: For detailed information please refer to IC data sheet:

SITRONIX---ST7637-G3



## 1. SPECIFICATIONS

### 1.1 Features

#### LCD Panel

Item	Standard Value
Display Type	128*(R,G,B)*128 Dots
LCD Type	CSTN, Negative, Transmissive
Driver Condition	LCD Module 1/128 Duty, 1/12 Bias
Screen size (inch)	1.45" (Diagonal)
Viewing Direction	6 O'clock
Color configuration	R.G.B. vertical stripe
Backlight Type	White LED
Interface	8 bit Parallel data bus for 8080 or 6800 MPU system
Driver IC	ST7637-G3 (Support 65K Colors)

### 1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	33.35(W)*41.64(L)*3.2(H)	mm

#### LCD Panel

Item	Standard Value	Unit
Viewing Area	28.3(W)*30.17(L)	mm
Active Area	25.716(W)*27.508(L)	mm
Dot Size	0.055(W)*0.203(L)	mm
Dot Pitch	0.067(W)*0.215(L)	mm

Note: For detailed information please refer to LCM drawing



### 1.3 Absolute Maximum Ratings

#### LCD Panel

Item	Symbol	Condition	Min.	Max.	Unit
LCD Driver Supply Voltage	V0-XV0	-	-0.3	+20.0	V

#### Module

Item	Symbol	Condition	Min.	Max.	Unit
System Power Supply Voltage	VDD	-	-0.3	+4.2	V
Operating Temperature	T <sub>OP</sub>	-	0	+50	°C
Storage Temperature	T <sub>ST</sub>	-	-20	+70	°C
Storage Humidity	H <sub>D</sub>	Ta < 40°C	20	90	%RH

### 1.4 DC Electrical Characteristics

VDD=3.2V, VSS=0V, Ta=25°C

Item	Symbol	Condition	Min.	Type	Max.	Unit
Logic Supply Voltage	VDD	-	3.1	3.2	3.3	V
Input High Voltage	V	-	0.7*VDD	-	VDD	V
Input Low Voltage	V	-	VSS	-	0.3*VDD	V
Output High Voltage	V	I	0.8*VDD	-	VDD	V
Output Low Voltage	V	I	VSS	-	0.2*VDD	V
Supply Current	I	VDD=3.2V, VOP=14.1V Pattern=Full display	-	0.7	-	mA
		VDD=3.2V, VOP=14.1V Pattern=Picture*1	-	0.9	1.5	
LCD Driver Voltage	V	0	14.15	14.35	14.55	V
		+25	13.9	14.1	14.3	
		+50	13.5	13.7	13.9	

Note:

\*1. Maximum current display

\*2. The VOP test point is V0-XV0



### 1.5 Optical Characteristics

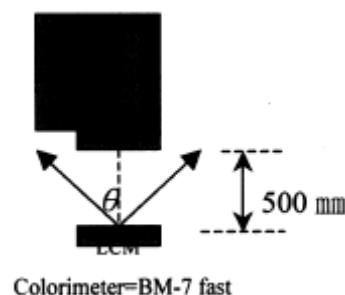
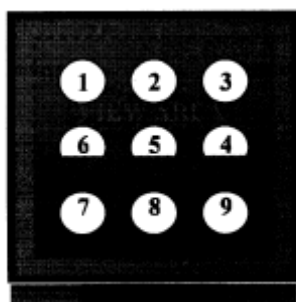
CSTN LCD Panel

VDD=3.2V, Ta=25°C

Item	Symbol	Condition	Min.	Type.	Max	Unit			
Response time	Rise	Ta=25°C $\theta X, \theta Y=0^\circ$	-	300	450	ms	Note2		
	Fall		-	90	135				
Viewing angle	Top	CR ≥ 2	35			Deg.	Note4		
	Bottom		25						
	Left		45						
	Right		45						
Contrast ratio		CR	Ta=25°C $\theta X, \theta Y=0^\circ$		-	19	-	-	Note3
Color of CIE Coordinate (With B/L)	White	X	Ta=25°C $\theta X, \theta Y=0^\circ$	0.22	0.27	0.32	-	Note1	
		Y		0.27	0.32	0.37			
	Red	X		0.41	0.46	0.51			
		Y		0.26	0.31	0.36			
	Green	X		0.24	0.29	0.34			
		Y		0.46	0.51	0.56			
	Blue	X		0.11	0.16	0.21			
		Y		0.08	0.13	0.18			
Average Brightness Pattern=white display (With B/L)		IV	IF=20mA	50	80	-	cd/m <sup>2</sup>	Note1	
Uniformity (With B/L)*1		△B	IF=20mA	70	-	-	%	Note1	

Note 1:

1.  $\Delta B = B(\min)/B(\max)$
2. Measurement Condition for Optical Characteristics:
  - a. Environment: 25°C ± 5°C / 60 ± 20% R.H, no wind, dark room below 10 Lux at typical lamp current and typical operating frequency.
  - b. Measurement Distance 500 ± 50mm, ( $\theta = 0^\circ$ )
  - c. Equipment: TOPCON BM-7 fast, (field 1°), after 10 minutes operation.
  - d. The uncertainty of the C.I.E coordinate measurement ± 0.01, Average Brightness ± 4%

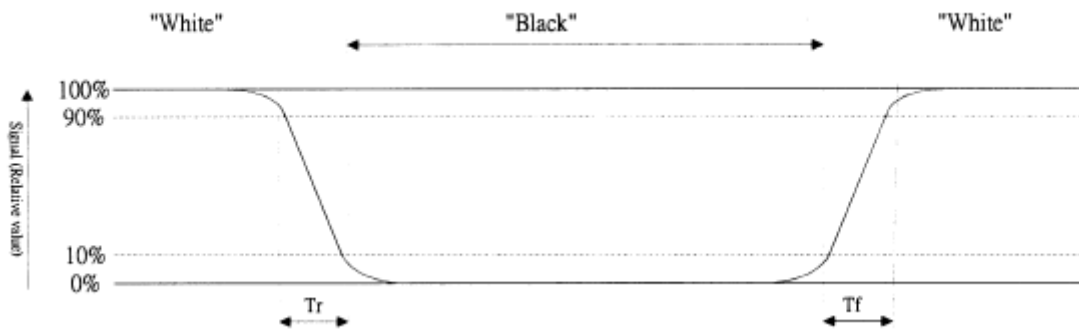




Note 2: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white” (falling time) and from “white” to “black” (rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:



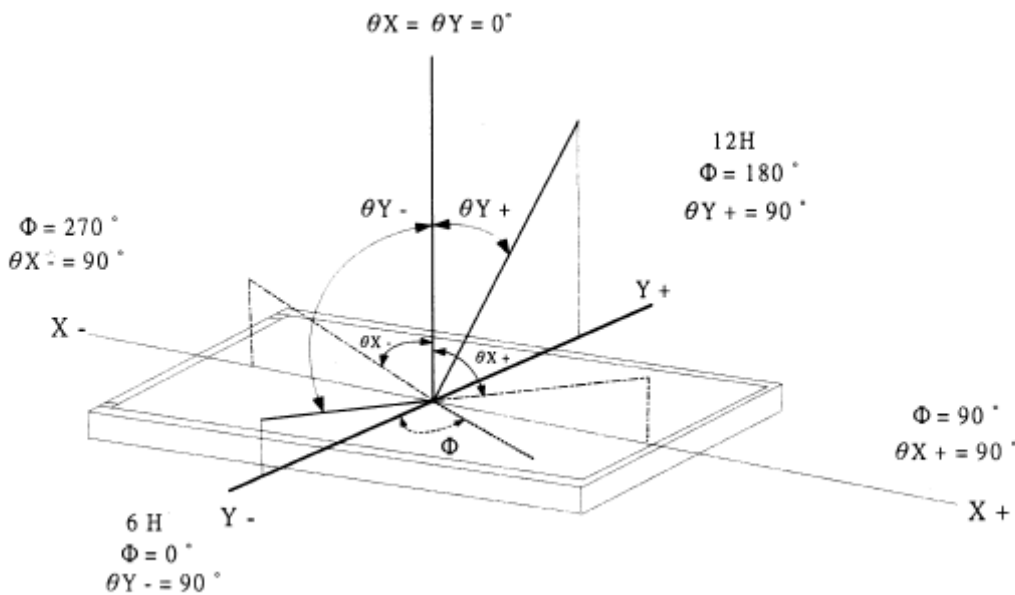
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note 4: Definition of viewing angle:

Refer to figure as below:





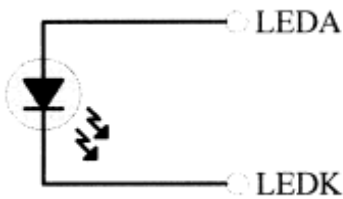
## 1.6 Backlight & LED Characteristics

### Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta=25°C	-	30	mA
Reverse Voltage	VR	Ta=25°C	-	5	V
Power Dissipation	PO	Ta=25°C	-	120	mW

### Electrical / Optical Characteristics

Item	Symbol	Conditions	Min.	Type.	Max.	Unit
Forward Voltage	VF	IF=20mA	-	3.3	3.7	V
Reverse Current	IR	VR=5V	-	-	0.05	mA





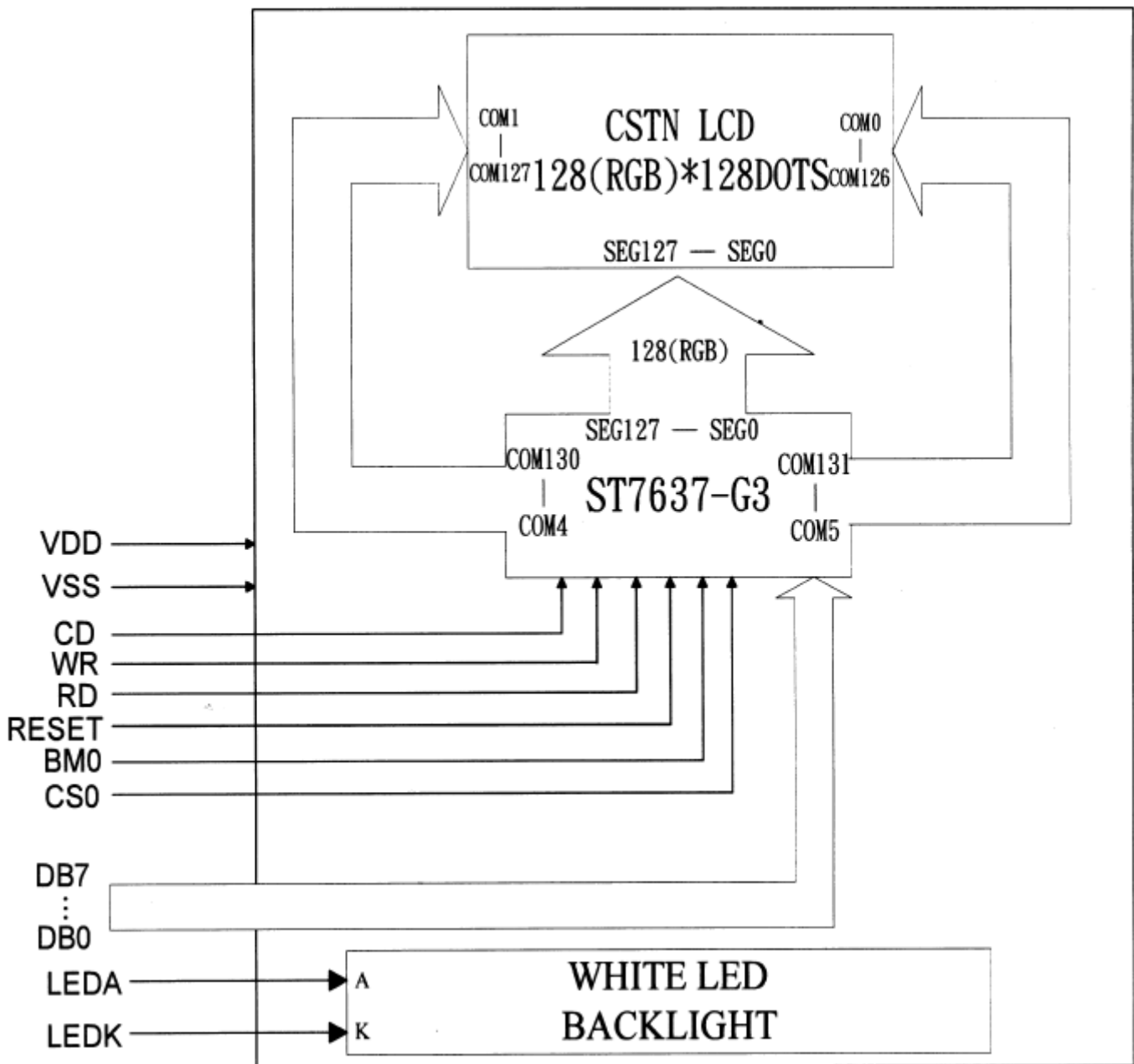
## 2. MODULE STRUCTURE

### 2.1 Counter Drawing

#### 2.1.1 LCM Mechanical Diagram

\*See Appendix

#### 2.1.2 Block Diagram





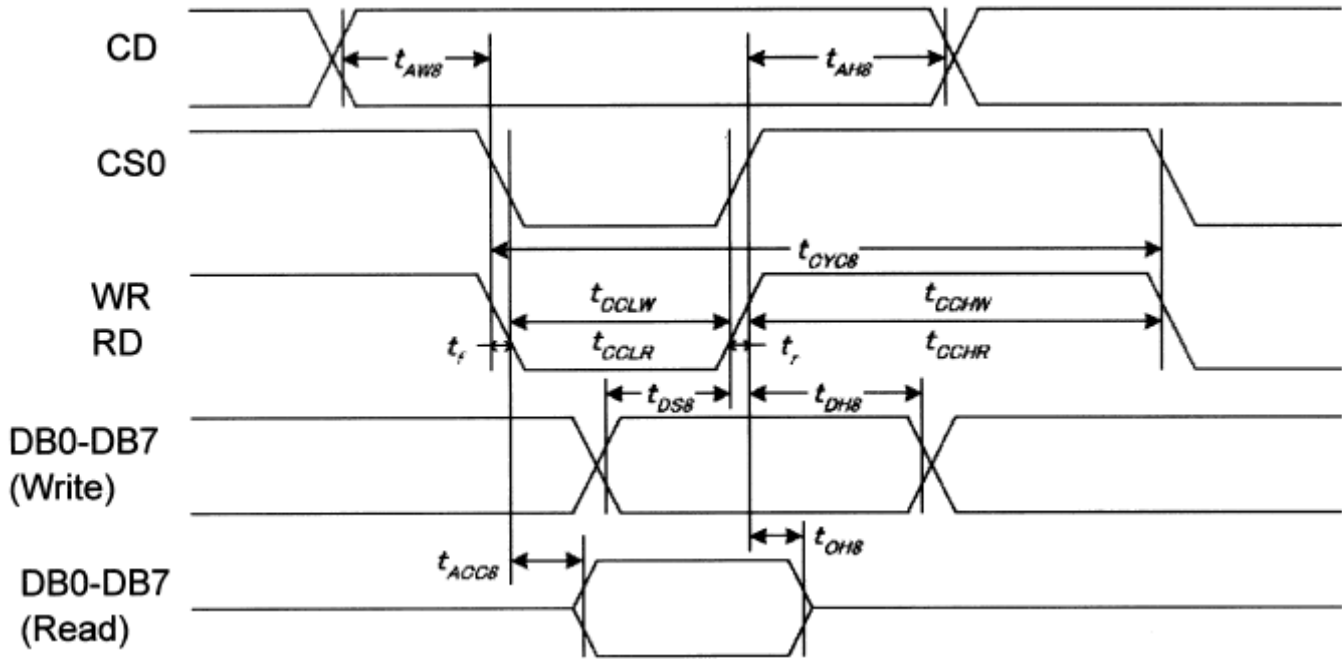
## 2.2 Interface Pin Description

Pin No.	Symbol	Function	
1	LEDA	Power supply for LED Backlight Anode input.	
2	LEDA	Power supply for LED Backlight Cathode input.	
3	CS0	Chip select signal, Active “L”.	
4	RESET	Reset input pin. When RESET is “L”, initialization is executed.	
5	CD	Command / Display data selection. 0: Command, 1: Display data.	
6	WR	Write signal input, Active “L”.	
7	RD	Read signal input, Active “L”.	
8	DB7	Bi-directional data bus.	
9	DB6	Bi-directional data bus.	
10	DB5	Bi-directional data bus.	
11	DB4	Bi-directional data bus.	
12	DB3	Bi-directional data bus.	
13	DB2	Bi-directional data bus.	
14	DB1	Bi-directional data bus.	
15	DB0	Bi-directional data bus.	
16	VSS	System ground. (0V)	
17	VDD	Power supply for the internal logic circuit. (+3.2V)	
18	BM0	Parallel / Serial data input select pin.	
		BM0	MPU interface type
		VDD	80 series 8-bits parallel
		VSS	68 series 8-bits parallel
19	NC	Not connection. (Must be open)	
20	NC	Not connection. (Must be open)	
21	NC	Not connection. (Must be open)	
22	NC	Not connection. (Must be open)	
23	NC	Not connection. (Must be open)	
24	NC	Not connection. (Must be open)	



### 2.3 Timing Characteristics

#### 80-System Bus Operation



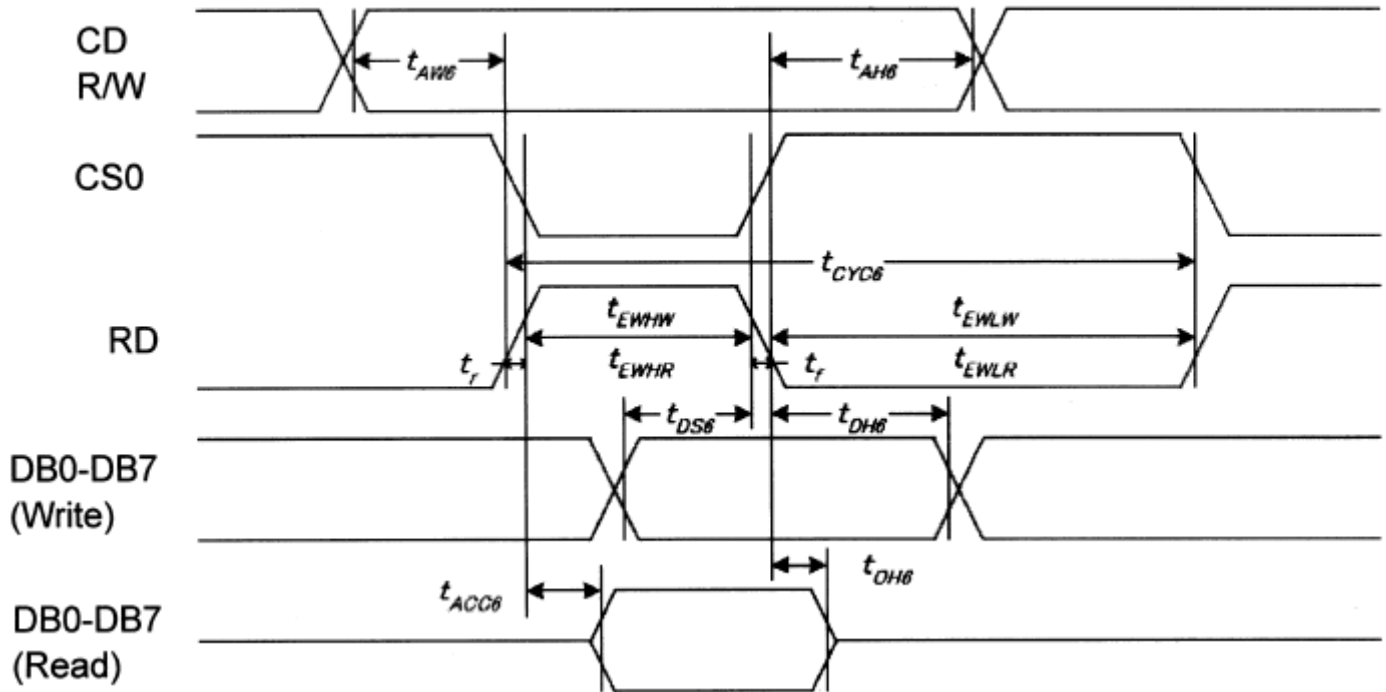
VDD=3.2V, Ta=25°C

Item	Signal	Symbol	Condition	Rating		Units
Address hold time	CD	$t_{AH8}$		10	-	ns
Address setup time		$t_{AW8}$		10	-	
System cycle time (WRITE)	WR	$t_{CYC8}$		170	-	ns
/WR L pulse width (WRITE)		$t_{CCLW}$		50	-	
/WR H pulse width (WRITE)		$t_{CCHW}$		100	-	
System cycle time (READ)	RD(ID)	$t_{CYC8}$		90	-	ns
/RD L pulse width (READ)		$t_{CCLR}$	When read ID data	55	-	
/RD H pulse width (READ)		$t_{CCHR}$		30	-	
System cycle time (READ)	RD(FM)	$t_{CYC8}$		180	-	ns
/RD L pulse width (READ)		$t_{CCLR}$	When read from frame memory	55	-	
/RD H pulse width (READ)		$t_{CCHR}$		90	-	
WRITE data setup time	DB0 to DB7	$t_{DS8}$		50	-	ns
WRITE data hold time		$t_{DH8}$		10	-	
READ access time (ID)		$t_{ACC8(ID)}$		-	50	
READ access time (FM)		$t_{ACC8(ID)}$	CL=100pF	-	70	
READ Output disable time		$t_{OH8}$	CL=100pF	-	60	



68-Syssem Bus operation

68-Syssem Bus Operation

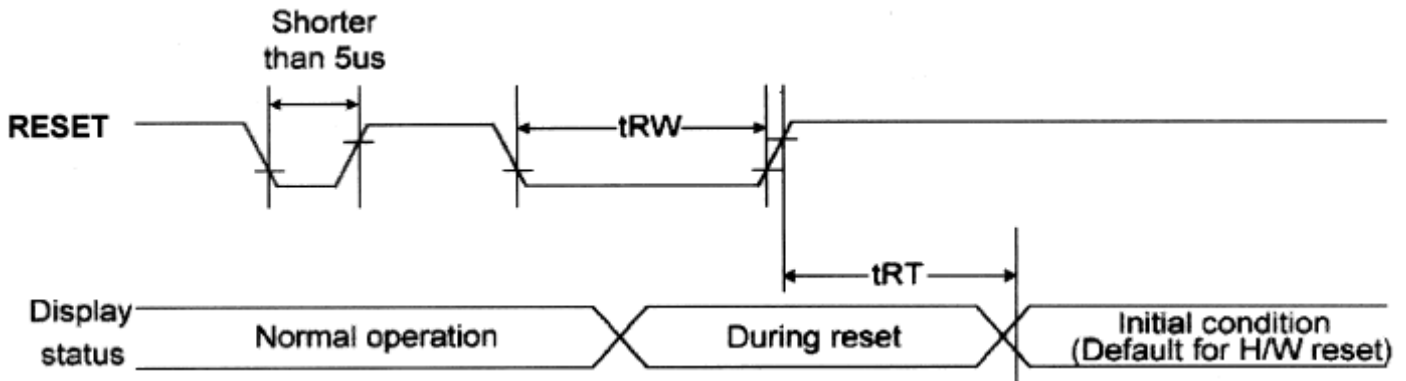


VDD=3.2V, Ta=25°C

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max	
Address hold time	CD	$t_{AH8}$		10	-	ns
Address setup time		$t_{AW8}$		10	-	
System cycle time (WRITE)	RD	$t_{CYC8}$		195	-	ns
/WR L pulse width (WRITE)		$t_{CCLW}$		150	-	
/WR H pulse width (WRITE)		$t_{CCHW}$		45	-	
System cycle time (READ)	RD(ID)	$t_{CYC8}$	When read ID data	160	-	ns
/RD L pulse width (READ)		$t_{CCLR}$		80	-	
/RD H pulse width (READ)		$t_{CCHR}$		80	-	
System cycle time (READ)	RD(FM)	$t_{CYC8}$	When read from frame memory	160	-	ns
/RD L pulse width (READ)		$t_{CCLR}$		80	-	
/RD H pulse width (READ)		$t_{CCHR}$		80	-	
WRITE data setup time	DB0 to DB7	$t_{DS8}$		50	-	ns
WRITE data hold time		$t_{DH8}$		10	-	
READ access time (ID)		$t_{ACC8(ID)}$		-	70	
READ access time (FM)		$t_{ACC8(FM)}$	CL=100pF	-	70	
READ Output disable time		$t_{OH8}$	CL=100pF	-	60	



LCD Reset



VDD=2.8V, Ta=25°C

Item	Symbol	Condition	Min.	Max.	Unit
Reset low-level width	$t_{RW}$	-	10	-	us
Reset time	$t_{RT}$		-	5*1	ms
				120*2	ms

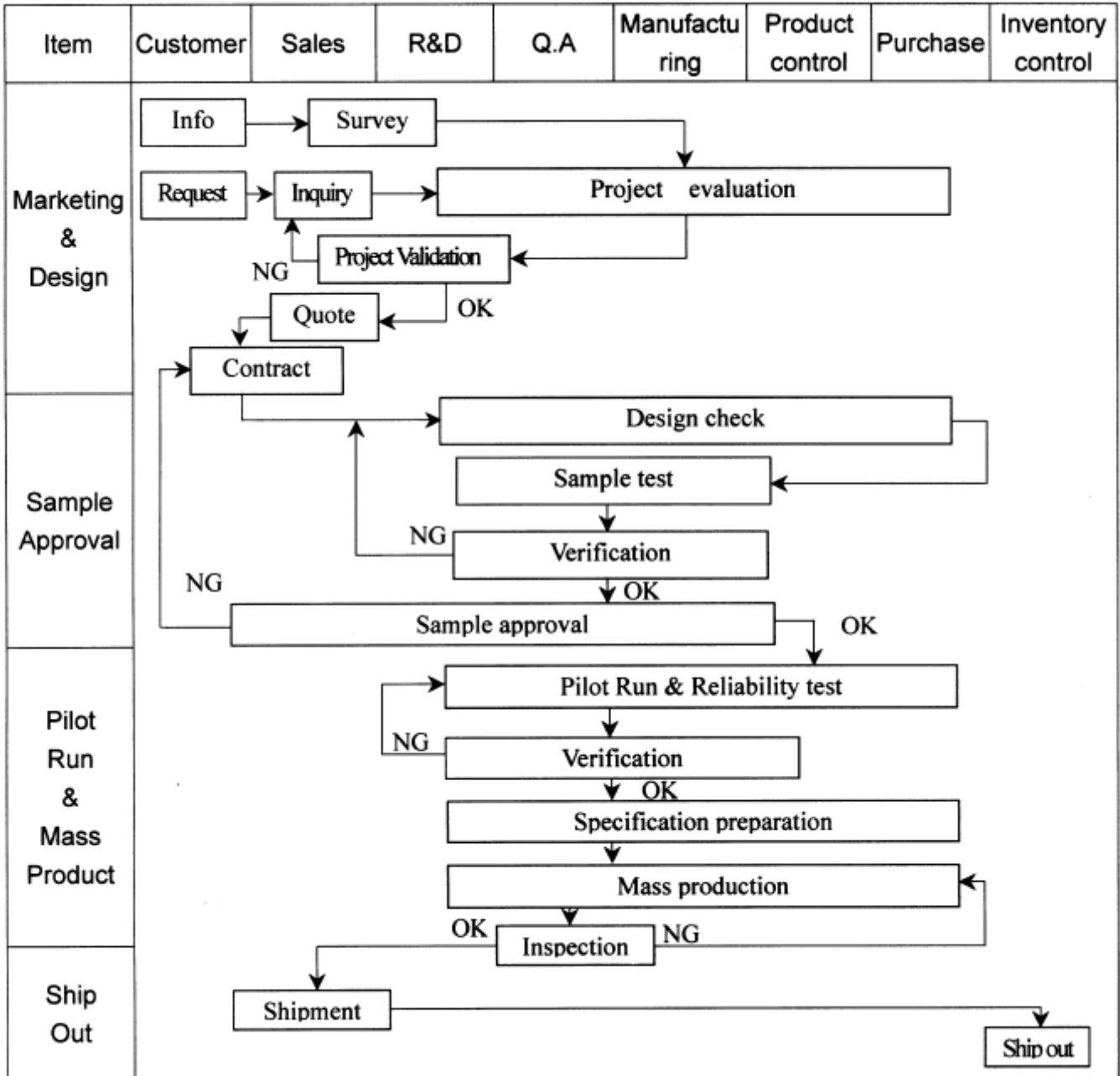
- Note:
1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from EEPROM (or similar device) to registers. This loading is done every time when there is HW reset cancel time ( $t_{RT}$ ) within 5 ms after a rising edge of RST
  2. Spike due to an electrostatic discharge on RST line does not cause irregular system reset according to the table below:

RST Pulse	Action
Shorter than $5 \mu s$	Reset Rejected
Longer than $9 \mu s$	Reset
Between $5 \mu s$ and $9 \mu s$	Reset starts



### 3. QUALITY ASSURANCE SYSTEM

#### 3.1 Quality Assurance Flow Chart





# 晶發科技有限公司 GI FAR TECHNOLOGY CO.,LTD

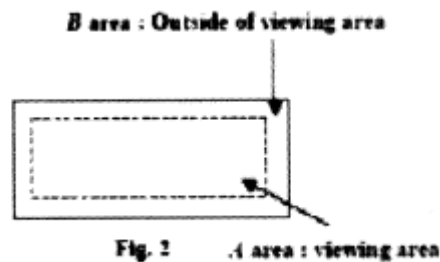
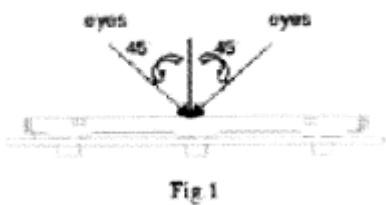
GFCS015BA128128

Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	<pre> graph TD     Info[Info] --&gt; Claim[Claim]     Claim --&gt; Failure[Failure analysis]     Failure --&gt; Report[Analysis report]     Failure --&gt; Action[Corrective action]     Action --&gt; Tracking[Tracking]           </pre>							
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management				2. Process improvement proposal 4. Education And Training Activities			



### 3.2 Inspection Specification

- ◆ Scope: The document shall be applied to LCD Module for Monotype and Color STN (Ver.02)
- ◆ Inspection Standard: MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆ Equipment: Gauge, MIL-STD, Powertip Tester, Sample
- ◆ Defect Level: Major Defect AQL: 0.4, Minor Defect, AQL:1.5
- ◆ OUT Going Defect Level : Sampling.
- ◆ Manner of appearance test:
  - (1). The test be under 20w\*2 fluorescent light and distance of view must be at 30 cm.
  - (2). Standard of inspection: (Unit: mm)
  - (3). The test direction is base on about around 45° of vertical line. (Fig.1)
  - (4). Definition of area (Fig.2)

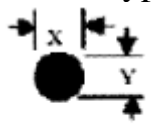



#### ◆ Specification;

No.	Item	Criterion	Level
01	Product condition	1.1 The part number is inconsistent with work order of production.	Major
		1.2 Mixed production types.	Major
		1.3 Assembled in inverse direction.	Major
02	Quantity	2.1 The quantity is inconsistent with work order of production.	Major
03	Outline dimension	3.1 Product dimension and structure must conform to structure diagram.	Major
04	Electrical Testing	4.1 Missing line character and icon.	Major
		4.2 No function or no display.	Major
		4.3 Output data is error.	Major
		4.4 LCD viewing angle defect.	Major
		4.5 Current consumption exceeds product specifications.	Major



◆ Specification For Monotype and Color STN:

NO	Item	Criterion	Level																																	
05	<p>Black or white dot, scratch, contamination</p> <p>Round type</p>  <p style="text-align: center;"><math>\Phi = (x+y)/2</math></p> <p>Line type</p> 	<p>5.1 Round type:</p> <p>5.1.1 display only: White and black spots on display <math>\leq 0.30</math> mm, no more than 4 white or black spots present.</p> <p>5.1.2 Non-display:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Dimension (diameter: <math>\Phi</math>)</th> <th style="width: 50%;">Acceptance (Q'ty)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\Phi \leq 0.10</math></td> <td style="text-align: center;">Accept no dense</td> </tr> <tr> <td style="text-align: center;"><math>&lt; 0.10 \Phi \leq 0.20</math></td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;"><math>0.20 &lt; \Phi \leq 0.30</math></td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">Total quantity</td> <td style="text-align: center;">4</td> </tr> </tbody> </table> <p>5.1.3 Line type:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="width: 50%;">Dimension</th> <th colspan="2" style="width: 50%;">Acceptance(Q'ty)</th> </tr> <tr> <th style="width: 25%;">Length(L)</th> <th style="width: 25%;">Width(W)</th> <th style="width: 12.5%;">A area</th> <th style="width: 12.5%;">B area</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">---</td> <td style="text-align: center;"><math>W \leq 0.03</math></td> <td style="text-align: center;">Accept no dense</td> <td style="text-align: center;">Don't count</td> </tr> <tr> <td style="text-align: center;"><math>L \leq 3.0</math></td> <td style="text-align: center;"><math>0.03 &lt; W \leq 0.05</math></td> <td rowspan="2" style="text-align: center;">4</td> <td style="text-align: center;">Don't count</td> </tr> <tr> <td style="text-align: center;"><math>L \leq 2.5</math></td> <td style="text-align: center;"><math>0.05 &lt; W \leq 0.075</math></td> <td style="text-align: center;">Don't count</td> </tr> <tr> <td style="text-align: center;">---</td> <td style="text-align: center;"><math>W &gt; 0.075</math></td> <td colspan="2" style="text-align: center;">As round type</td> </tr> </tbody> </table>	Dimension (diameter: $\Phi$ )	Acceptance (Q'ty)	$\Phi \leq 0.10$	Accept no dense	$< 0.10 \Phi \leq 0.20$	3	$0.20 < \Phi \leq 0.30$	2	Total quantity	4	Dimension		Acceptance(Q'ty)		Length(L)	Width(W)	A area	B area	---	$W \leq 0.03$	Accept no dense	Don't count	$L \leq 3.0$	$0.03 < W \leq 0.05$	4	Don't count	$L \leq 2.5$	$0.05 < W \leq 0.075$	Don't count	---	$W > 0.075$	As round type		Minor
Dimension (diameter: $\Phi$ )	Acceptance (Q'ty)																																			
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06	Polarizer Bubble	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 50%;">Dimension (diameter: <math>\Phi</math>)</th> <th colspan="2" style="width: 50%;">Acceptance (Q'ty)</th> </tr> <tr> <th style="width: 25%;">A area</th> <th style="width: 25%;">B area</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\Phi \leq 0.20</math></td> <td style="text-align: center;">Accept no dense</td> <td style="text-align: center;">Don't count</td> </tr> <tr> <td style="text-align: center;"><math>0.20 &lt; \Phi \leq 0.50</math></td> <td style="text-align: center;">3</td> <td style="text-align: center;">Don't count</td> </tr> <tr> <td style="text-align: center;"><math>0.50 &lt; \Phi \leq 1.00</math></td> <td style="text-align: center;">2</td> <td style="text-align: center;">Don't count</td> </tr> <tr> <td style="text-align: center;"><math>\Phi &gt; 1.00</math></td> <td style="text-align: center;">0</td> <td style="text-align: center;">Don't count</td> </tr> <tr> <td style="text-align: center;">Total quantity</td> <td style="text-align: center;">4</td> <td style="text-align: center;">Don't count</td> </tr> </tbody> </table>	Dimension (diameter: $\Phi$ )	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.20$	Accept no dense	Don't count	$0.20 < \Phi \leq 0.50$	3	Don't count	$0.50 < \Phi \leq 1.00$	2	Don't count	$\Phi > 1.00$	0	Don't count	Total quantity	4	Don't count	Minor													
Dimension (diameter: $\Phi$ )	Acceptance (Q'ty)																																			
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$\Phi > 1.00$	0	Don't count																																		
Total quantity	4	Don't count																																		


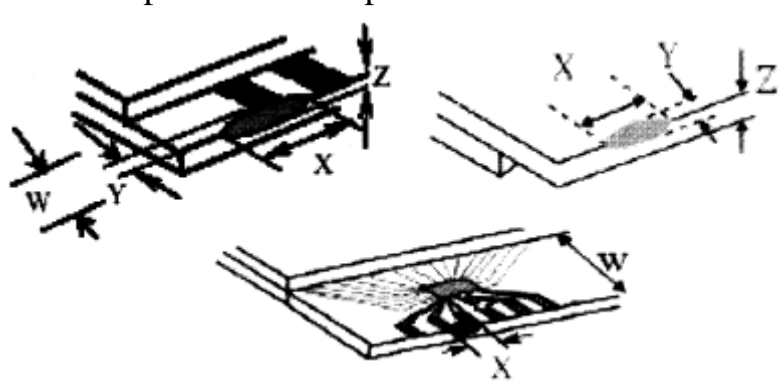


◆ Specification For Monotype and Color STN:

No	Item	Criterion	Level									
07	The crack of glass	<p>Symbols:            X: The length of crack            Z: The thickness of crack            t: The thickness of glass</p> <p style="text-align: right;">Y: The width of crack.            W: terminal length            a: LCD side length</p> <p>7.1 General glass chip:            7.1.1 Chip on panel surface and crack between panels:</p> <div style="text-align: center;"> </div> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 25%;">X</th> <th style="width: 50%;">Y</th> <th style="width: 25%;">Z</th> </tr> </thead> <tbody> <tr> <td><math>\leq a</math></td> <td>Crack can't enter Viewing area</td> <td><math>\leq 1/2t</math></td> </tr> <tr> <td><math>\leq a</math></td> <td>Crack can't exceed the half of SP width.</td> <td><math>1/2t &lt; Z \leq 2t</math></td> </tr> </tbody> </table>	X	Y	Z	$\leq a$	Crack can't enter Viewing area	$\leq 1/2t$	$\leq a$	Crack can't exceed the half of SP width.	$1/2t < Z \leq 2t$	Minor
X	Y	Z										
$\leq a$	Crack can't enter Viewing area	$\leq 1/2t$										
$\leq a$	Crack can't exceed the half of SP width.	$1/2t < Z \leq 2t$										

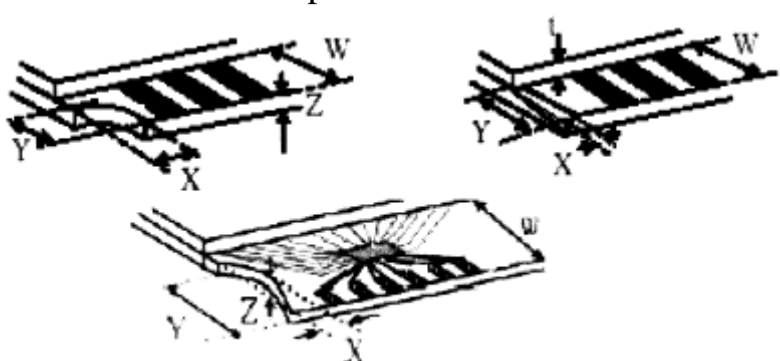



◆ Specification For Monotype and Color STN:

NO	Item	Criterion	Level																					
07	The crack of glass	<p>Symbols:            X: The length of crack            Z: The thickness of crack            t: The thickness of glass</p> <p style="text-align: right;">Y: The width of crack.            W: terminal length            a: LCD side length</p> <p>7.1.2 Corner crack;</p> <div style="text-align: center;">  </div> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">X</th> <th style="width: 40%;">Y</th> <th style="width: 35%;">Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\leq 1/5a</math></td> <td style="text-align: center;">Crack can't enter Viewing area</td> <td style="text-align: center;"><math>Z \leq 1/2t</math></td> </tr> <tr> <td style="text-align: center;"><math>\leq 1/5a</math></td> <td style="text-align: center;">Crack can't exceed the half of SP width.</td> <td style="text-align: center;"><math>1/2t &lt; Z \leq 2t</math></td> </tr> </tbody> </table> <p>7.2 Protrusion over terminal:            7.2.1 Chip on electrode pad:</p> <div style="text-align: center;">  </div> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 15%;">X</th> <th style="width: 15%;">Y</th> <th style="width: 15%;">Z</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Front</td> <td style="text-align: center;"><math>\leq a</math></td> <td style="text-align: center;"><math>\leq 1/2W</math></td> <td style="text-align: center;"><math>\leq t</math></td> </tr> <tr> <td style="text-align: center;">Back</td> <td colspan="3" style="text-align: center;">Neglect</td> </tr> </tbody> </table>	X	Y	Z	$\leq 1/5a$	Crack can't enter Viewing area	$Z \leq 1/2t$	$\leq 1/5a$	Crack can't exceed the half of SP width.	$1/2t < Z \leq 2t$		X	Y	Z	Front	$\leq a$	$\leq 1/2W$	$\leq t$	Back	Neglect			Minor
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◆ Specification For Monotype and Color STN:

NO	Item	Criterion	Level												
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X	Y	Z													
$\leq 1/3a$	$\leq W$	$\leq t$													
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◆ Specification For Monotype and Color STN

NO	Item	Criterion	Level
08	Backlight Elements	8.1 Backlight can't work normally.	Major
		8.2 Backlight doesn't light or color is wrong.	Major
		8.3 Illumination source flickers when lit.	Major
09	General appearance	9.1 Pin type must match type in specification sheet.	Major
		9.2 No short circuits in components on PCB or FPC.	Major
		9.3 Product packaging must the same as specified on packaging specification sheet.	Minor
		9.4 The folding and peeled off in polarizer are not acceptable.	Minor
		9.5 The PCB or FPC between B/L assembled distance (PCB or FPC) is $\leq 1.5$ mm.	Minor



## 4. RELIABILITY TEST

### 4.1 Reliability test Condition

VER.02

NO	TEST ITEM	TEST CONDITION											
1	High Temperature Storage Test	Keep in $+70 \pm 2^{\circ}\text{C}$ 96 hrs Surrounding temperature, then storage at normal condition 4hrs.											
2	Low Temperature Storage Test	Keep in $-20 \pm 2^{\circ}\text{C}$ 96hrs Surrounding temperature, then storage at normal condition 4hrs.											
3	High Temperature/ High Humidity Storage Test	Keep in $+40^{\circ}\text{C}$ / 90% R.H duration for 96 hrs Surrounding temperature, then storage at normal condition 4hrs. (Excluding the polarizer)											
4	ESD Test	Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/-	Contact Discharge: Apply 250V with 5 times Discharge for each polarity +/-										
5	Temperature Cycling Storage Test	$  \begin{array}{ccccccc}  0^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} & \rightarrow & +50^{\circ}\text{C} & \rightarrow & +25^{\circ}\text{C} \\  (30\text{mins}) & & (5\text{mins}) & & (30\text{mins}) & & (5\text{mins}) \\  \longleftarrow & & & & & & \longrightarrow \\  & & & & 10 \text{ Cycle} & &   \end{array}  $ Surrounding temperature, then storage at normal condition 4hrs.											
6	Vibration Test (Packaged)	1. Sine wave 10~55 Hz frequency (1 min) 2. The amplitude of vibration : 1.5 mm 3. Each direction (X, Y, Z) duration for 2 Hrs											
7	Drop Test (Packaged)	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Packing Weight (Kg)</th> <th style="width: 50%;">Drop Height (cm)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0~45.4</td> <td style="text-align: center;">122</td> </tr> <tr> <td style="text-align: center;">45.4~90.8</td> <td style="text-align: center;">76</td> </tr> <tr> <td style="text-align: center;">90.8~454</td> <td style="text-align: center;">61</td> </tr> <tr> <td style="text-align: center;">Over 454</td> <td style="text-align: center;">46</td> </tr> </tbody> </table> Drop direction: * 1 corner / 3 edges / 6 sides each 1 times		Packing Weight (Kg)	Drop Height (cm)	0~45.4	122	45.4~90.8	76	90.8~454	61	Over 454	46
Packing Weight (Kg)	Drop Height (cm)												
0~45.4	122												
45.4~90.8	76												
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## 5. PRECAUTION RELATING PRODUCT HANDLING

### 5.1 SAFETY

- 5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

### 5.2 HANDLING

- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI-When working with the module, be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So, please handle it very carefully, do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass, tweezers, etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands, this will stain the display area.
- 5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is  $280 \pm 10^{\circ}\text{C}$  and 3-5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM

### 5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush, shake, or jolt the module.

### 5.4 TERMS OF WARRANTY

#### 5.4.1 Applicable warrant period

The period is within thirteen months since the date of shipping out under normal using and storage conditions.

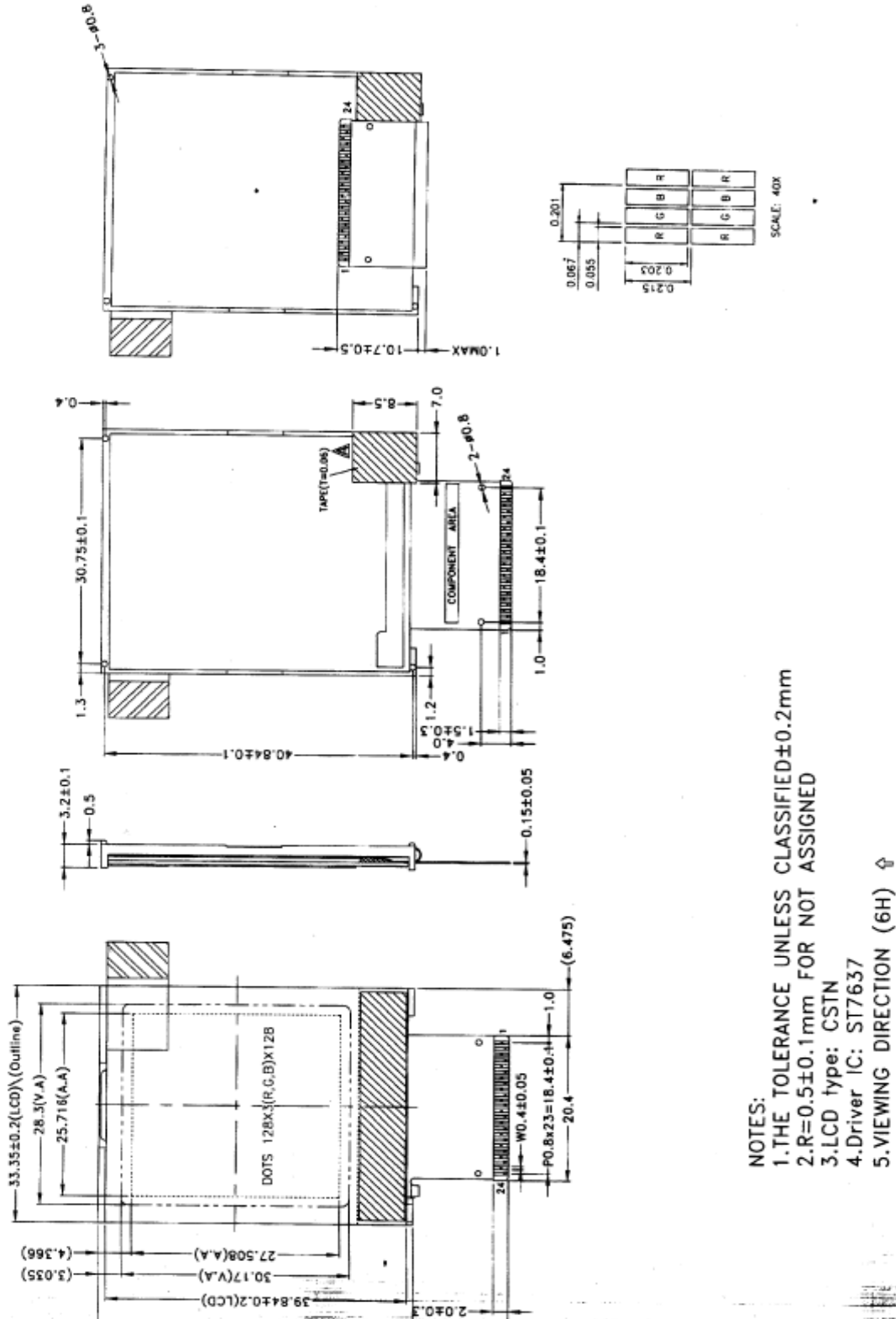
#### 5.4.2 Unaccepted responsibility

This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, aerospace equipment, fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.



PIN FUNCTION

NO	SYMBOL	FUNCTION
1	LEDA	
2	LEDK	
3	CSO	
4	RESET	
5	CD	
6	WR	
7	RD	
8	DB7	
9	DB6	
10	DB5	
11	DB4	
12	DB3	
13	DB2	
14	DB1	
15	DB0	
16	VSS	
17	VDD	
18	BMO	
19	NC	
20	NC	
21	NC	
22	NC	
23	NC	
24	NC	



- NOTES:
1. THE TOLERANCE UNLESS CLASSIFIED ±0.2mm
  2. R=0.5±0.1mm FOR NOT ASSIGNED
  3. LCD type: CSTN
  4. Driver IC: ST7637
  5. VIEWING DIRECTION (6H) ↕