DATA IMAGE CORPORATION

TFT Module Specification

ITEM NO.: FG100240DSSWAGT1

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	A	2008/1/25		24

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	5/NOV/07			Initial PRELIMINARY
2	29/NOV/07	15	24	Modify OUTLINE DRAWING
A	25/JAN/08	15	24	Modify OUTLINE DRAWING from rev 2 to rev B.

3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
LCD size	10.2 (Diagonal)	inch
Driver element	a-Si TFT active matrix	
Resolution	800X3(RGB)X480	dot
Display mode	Normally white, Transmissive	
Dot pitch	0.0925(W)X0.276(H)	mm
Active area	222.0(W)X132.48(H)	mm
Module size	235.0(W)X145.8(H)X7.46(D)	mm
Surface treatment	Anti-Glare	
Color arrangement	RGB-stripe	
Interface	Parallel RGB	
Backlight power consumption	2.57 (Typ.)	W
Panel power consumption	250 (Typ.)	mW
Weight	436	g

4. ABSOLUTE MAXIMUM RATINGS

GND=0V

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power voltage	V_{CC}	-0.3	-	5	V	
	DVDD	-0.3	-	5		
	AV_{DD}	-0.5	-	12	V	
	V_{GH}	0.3	-	18	V	
	V_{GL}	-15	-	0.3	V	
	V_{GH}-V_{GL}	-	-	33	V	
Input Signal voltage	Vi	-0.3		VCC+0.3		
Input Signal Voltage	Vref(V1~V7)	0.4AVDD	-	AVDD-0.1	V	Note 1
	Vref(V8~V14)	-0.3	-	0.6AVDD	V	Note 1
Operating temperature	Top	-5	-	60	℃	
Storage temperature	Tst	-20	-	70	℃	-

Note 1: AVDD - 0.1≥V1≥V2≥V3≥V4≥V5≥V6≥V7≥V8≥V9≥V10≥V11≥V12≥V13≥V14≥GND + 0.1
Note 2: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

5. ELECTRICAL CHARACTERISTICS

a. TFT-LCD Driving Conditions

GND=0V,Ta=25℃

Parameter	Symbol	MIN.	Typ.	MAX.	Unit
Power Supply voltage	V_{CC}	3.0	3.3	3.6	V
	DVDD	3.0	3.3	3.6	V
	AVDD	8.9	9.4	9.9	V
	VGH	15.5	16	16.5	V
	VCOM	3.4	3.9	4.4	V
	VGL	-7.5	-7	-6.5	V
Input Reference Voltage	V1~V7	0.4AVDD	--	AVDD-0.1	V
	V8~V14	0.1	--	0.6AVDD	V
"H" level logical input voltage	V_{IH}	0.8VCC	--	--	V
"L" level logical input voltage	V_{IL}	0	--	0.2 V_{CC}	V

b. Current consumption conditions

GND=0V, Ta=25℃

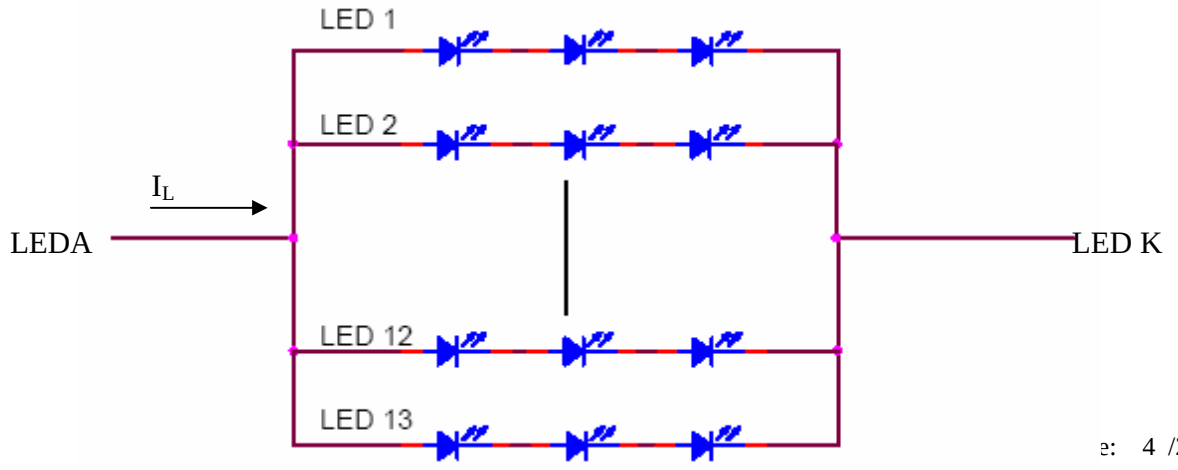
Parameter	Symbol	Condition	MIN.	Typ.	MAX.	Unit
Current For Driver	IGH	VGH=16V		0.3	1	mA
	IGL	VGL=-7V		0.3	1	mA
	ICC	VCC=3.3V		8	16	mA
	I_{AVDD}	AVDD=9.4V		25	50	mA
	I_{DVDD}	DVDD=3.3V		2.5	5	mA

c. Backlight driving conditions

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
LED voltage	V_L	-	9.9	10.5	V	Note 1:
LED Current	I_L	-	260	-	mA	
LED Life Time	-	20,000	--	-	Hours	

Note 1: The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ and IL =260mA.

Note 2:VL=LEDA-LEDK



6. TIMING CHARACTERISTICS

6.1. Timing Conditions

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
DCLK frequency	Fdclk	-	40	45	MHz
DCLK cycle	Tcph	22	25	-	ns
DCLK pulse width	Tcw	8	-	-	ns
Data set-up time	Tsu	4	-	-	ns
Data hold time	Thd	2	-	-	ns
Time that the last data to LD	Tld	1	-	-	Tcph
Pulse width of LD	Twld	2	-	-	Tcph
Time that LD to STHL/R	Tlds	5	-	-	Tcph
POL set-up time	Tpsu	6	-	-	ns
POL hold time	Tphd	6	-	-	ns
CKV frequency	Fvclk	-	-	200	KHz
CKV rise time	Trck	-	-	100	ns
CKV falling time	Tfck	-	-	100	ns
CKV pulse width	PWCLK	500	-	-	ns
Horizontal display timing range	Tdh	-	800	-	Tcph
Horizontal time range	Th	-	1056	-	Tcph
STVU/D setup time	Tsuv	200	-	-	ns
STVU/D hold time	Thdv	300	-	-	ns
STVU/D delay time	Tdt	-	-	500	ns
Driver output delay time	Tdo	-	-	900	ns
Output rise time	Ttlh	-	500	1000	ns
Output falling time	Tthl	-	400	800	ns
OEV pulse width	Twcl	1	-	-	us
OEV to Driver output delay time	Toe	-	-	900	ns
Horizontal lines per field	Tv	512	525	610	Tdh
Vertical display timing range	Tvd	-	480	--	Tdh

6.2 Timing Diagram

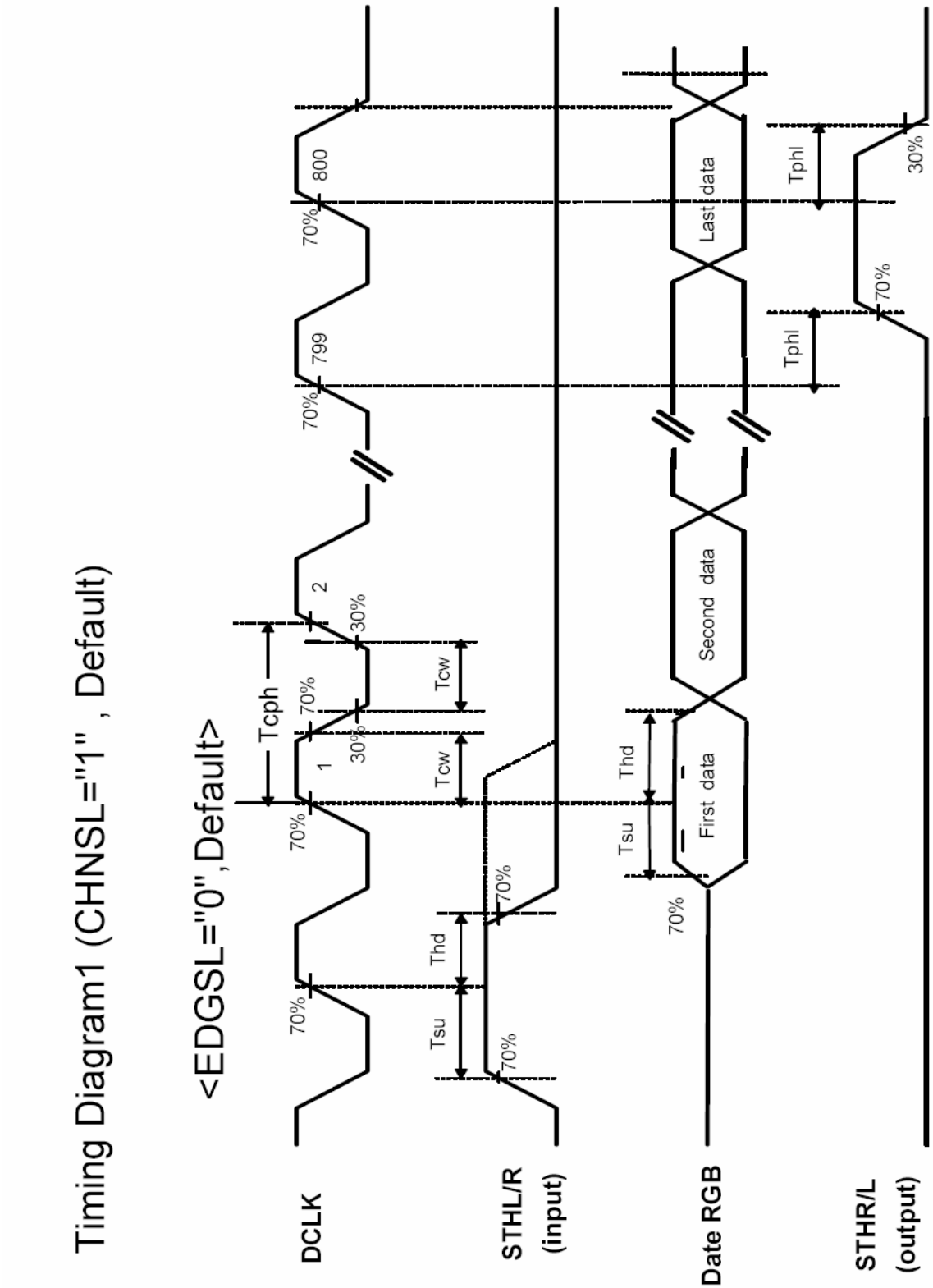


Fig.1 operation model 1

< EDGSL ="1">

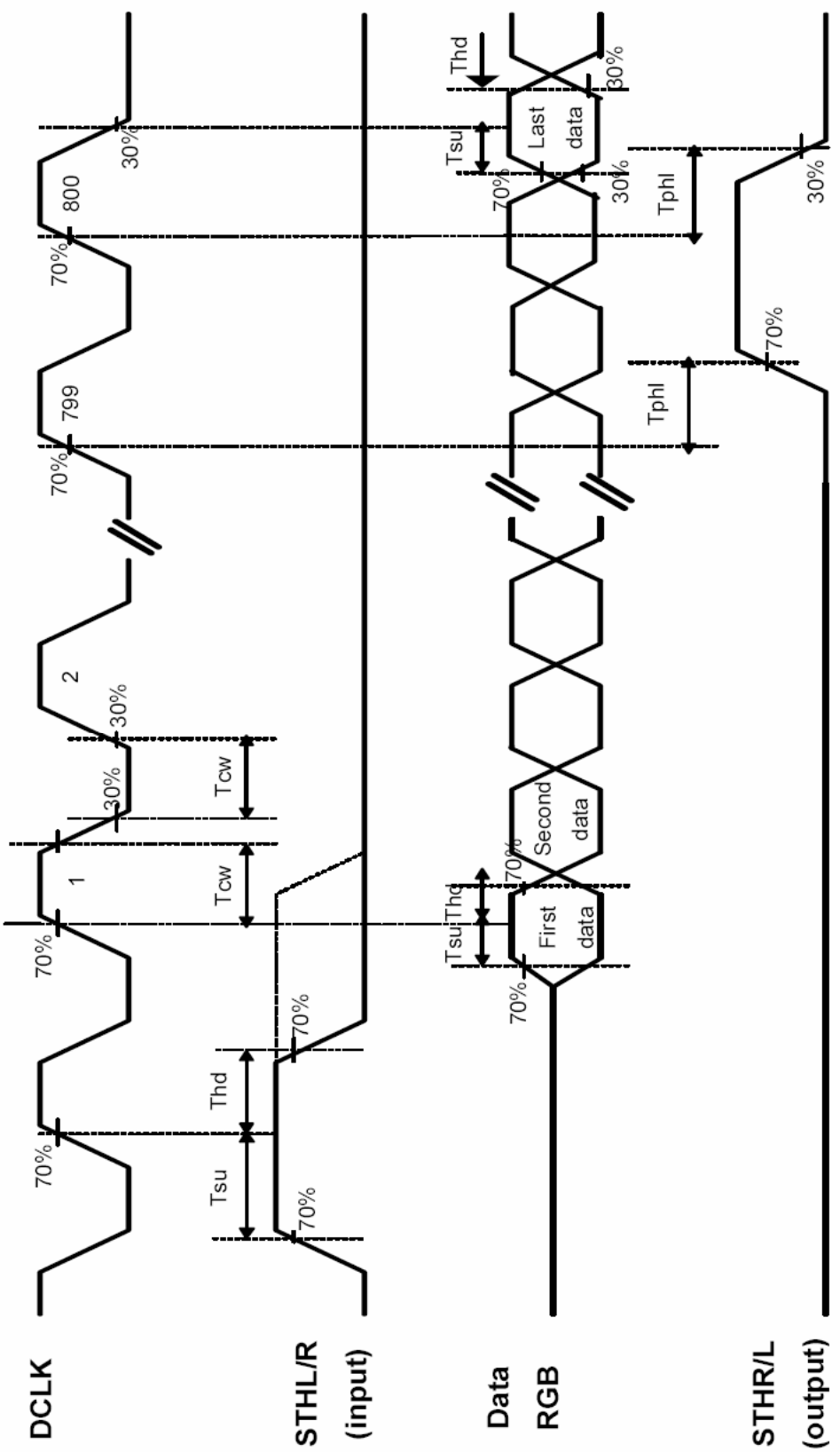


Fig.2 operation model 2

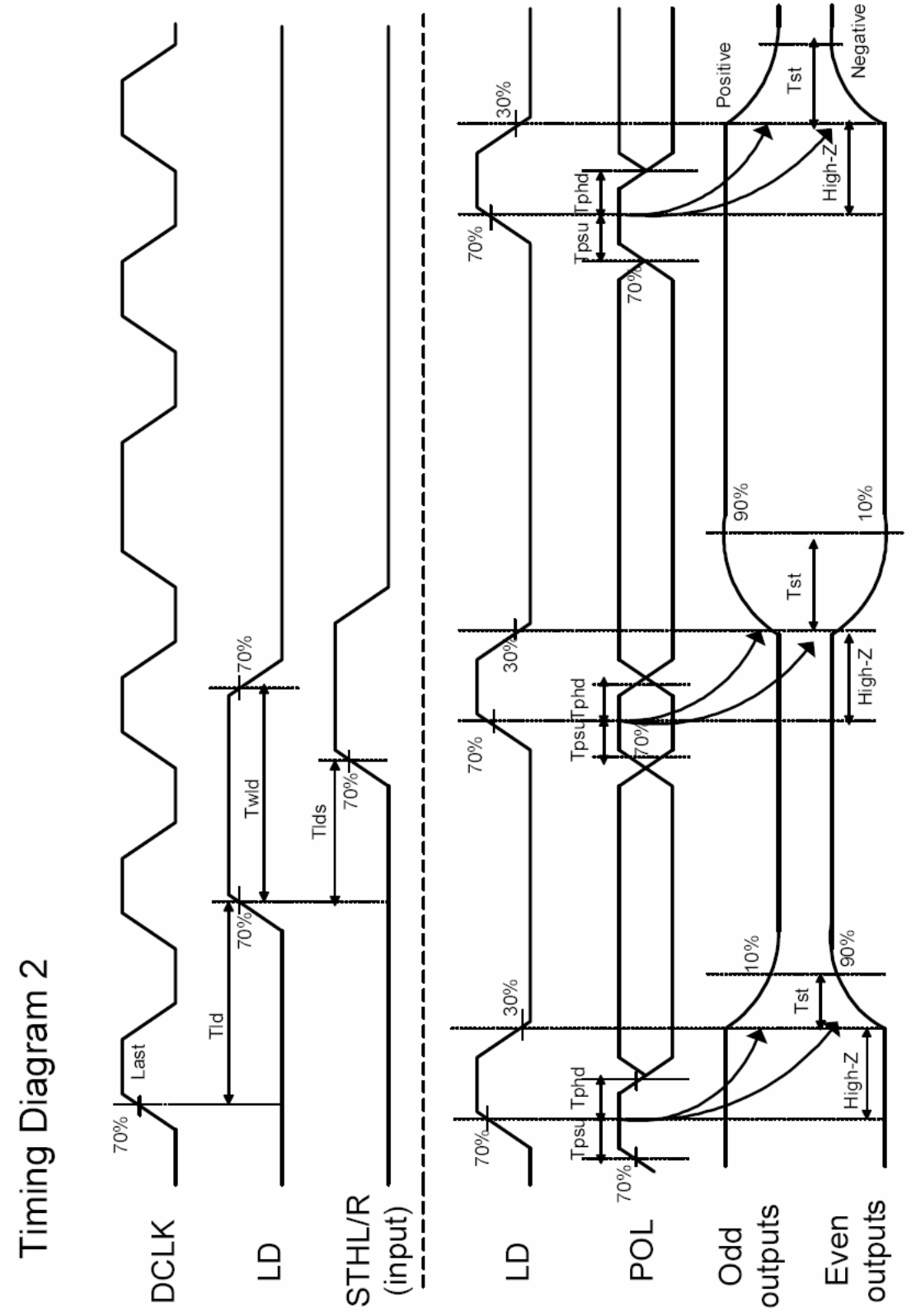


Fig.3 Horizontal timing 1

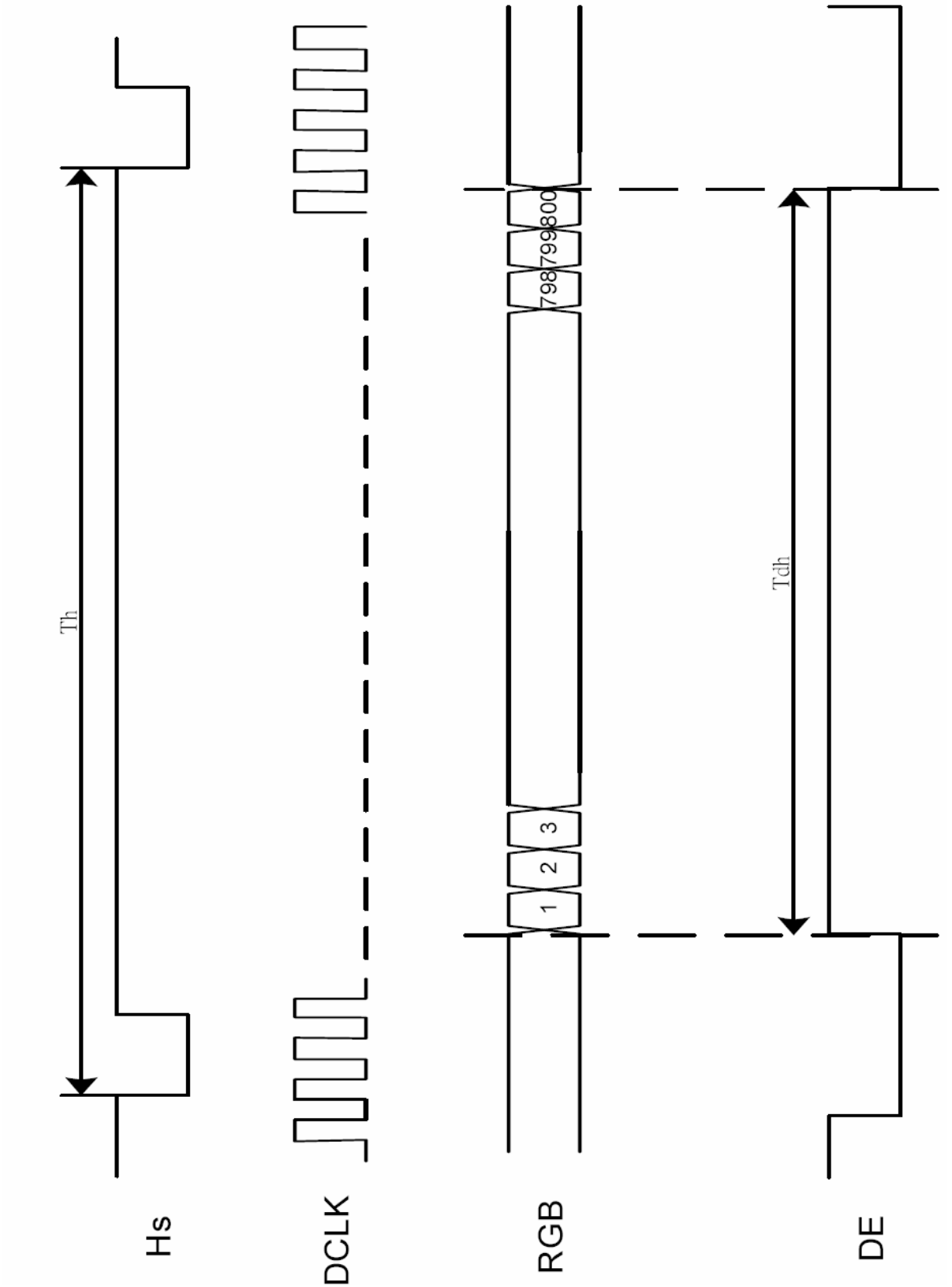


Fig.4 Horizontal timing 2

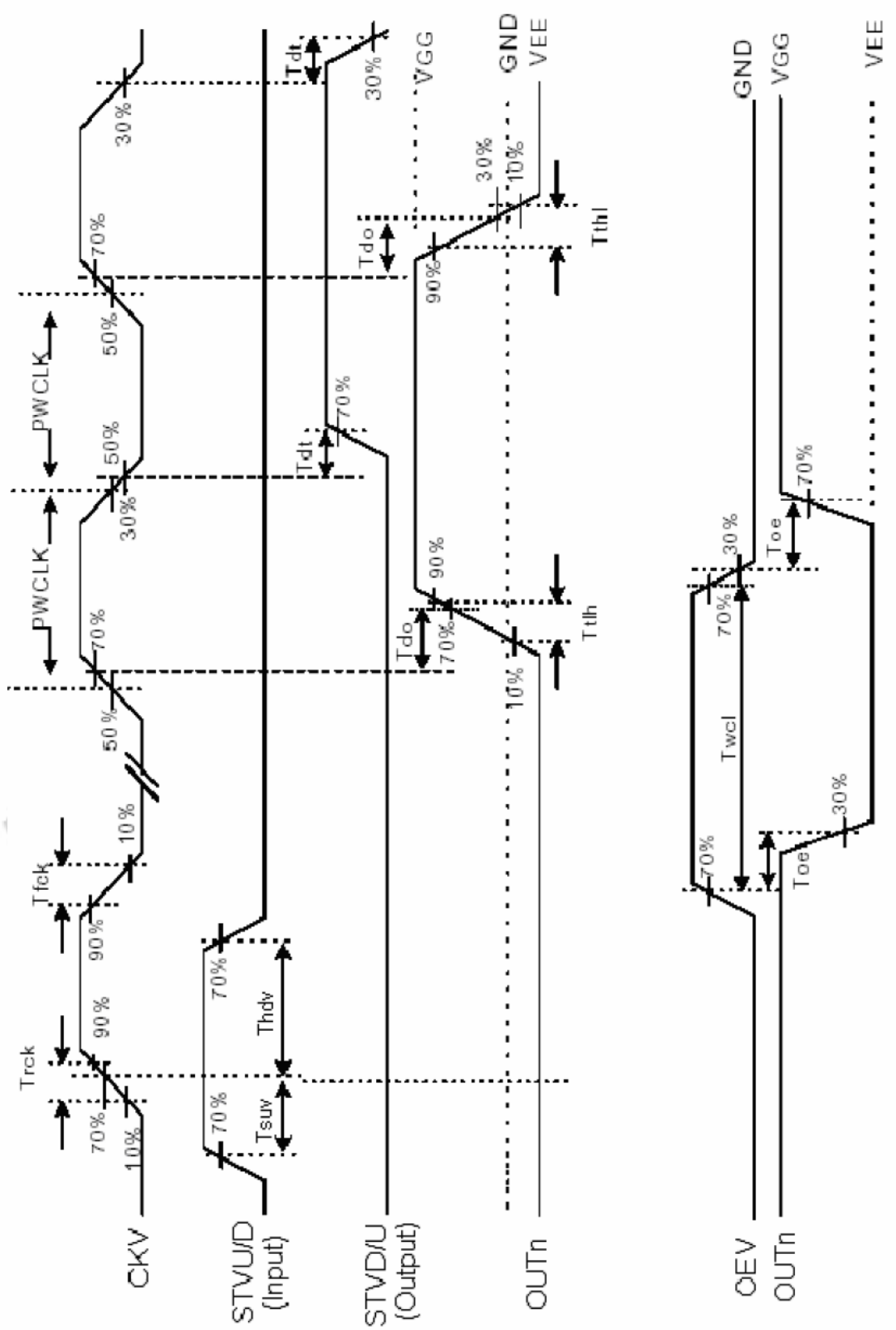


Fig.5 Vertical shift clock timing

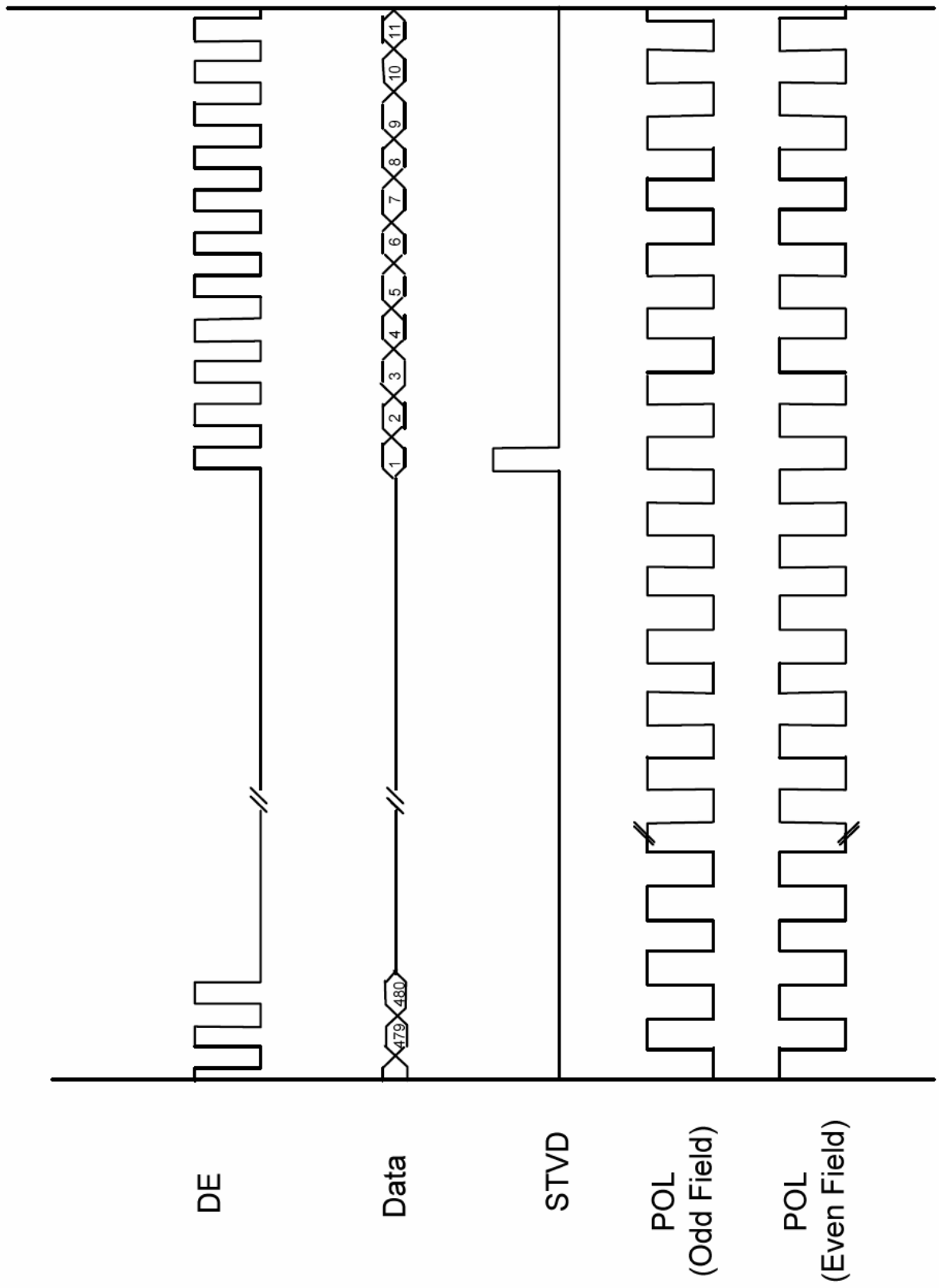


Fig.6 Vertical timing (from up to down)

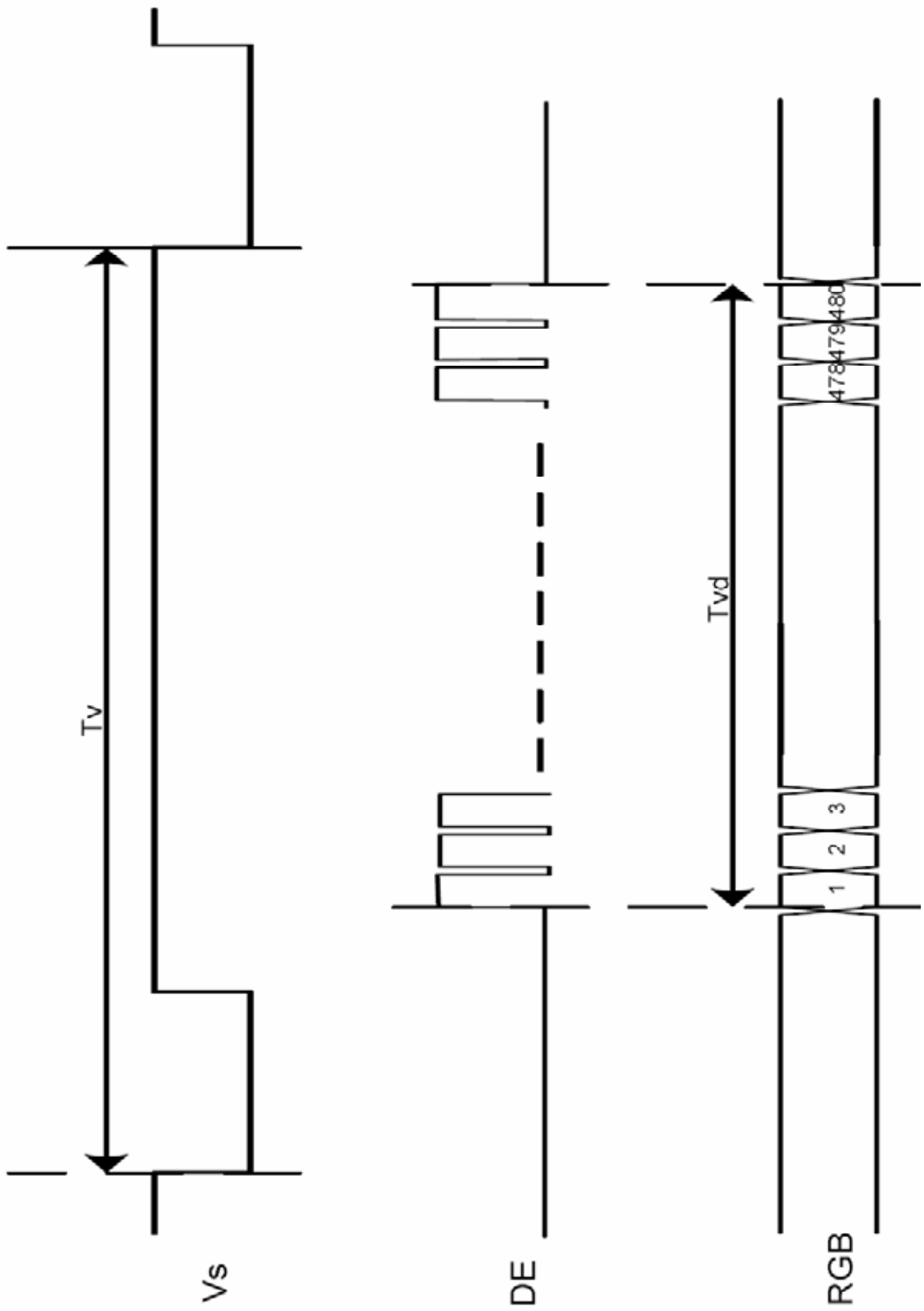


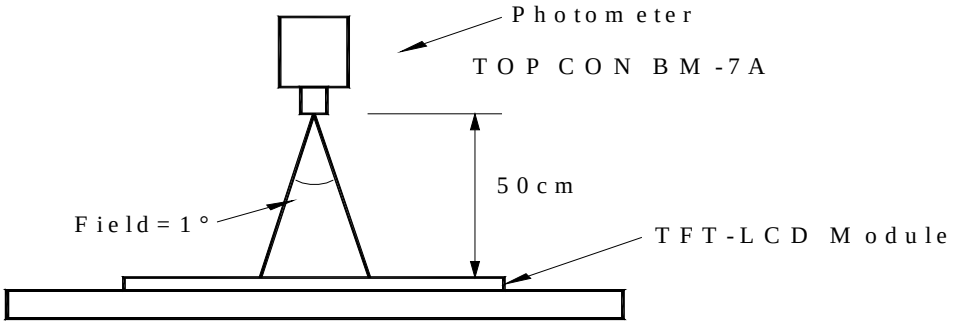
Fig.7 Vertical timing

7. OPTICAL CHARACTERISTIC

Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ_x+	Center CR≥10	55	65	--	deg	Note 1,4
		θ_x-		55	65	--		
	Vertical	θ_Y+		35	45	--		
		θ_Y-		55	65	--		
Contrast Ratio		CR max.	Center	250	300	--		Note 1,3
Response time	Rise	Tr	Center	-	15	30	ms	Note 1,6
	Fall	Tf	θx=θy =0°	-	20	40	ms	
Brightness Uniformity		B-uni	θx=θy =0°	70	75	--	%	Note1,5
Central Luminance		L	I_L=260mA	160	200	--	cd/m^2	Note 1,2,4
Chromaticity		x_W	Center θx=θy =0°	0.25	0.31	0.36		Note 1,7
		y_W		0.28	0.33	0.38		
Image sticking		tis	2 hours	--	--	2	Sec	Note 8

The following optical specifications shall be measured in a darkroom or equivalent state(ambient luminance≤1 lux, and at room temperature).The operation temperature is 25°C±2°C and LED current I_L=260mArms. The measurement method is shown in Note1.

Note1: The method of optical measurement:



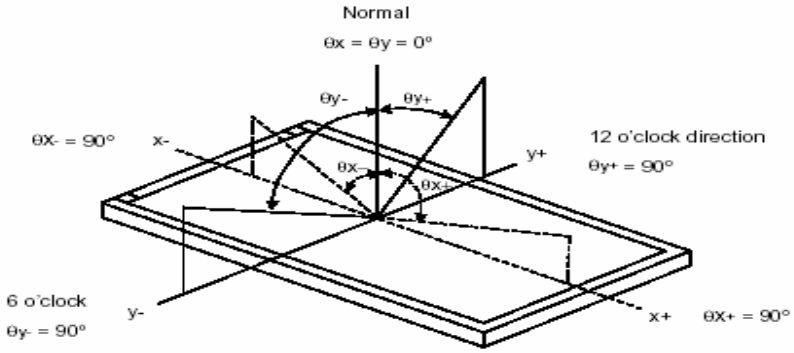
Note2: Definition of Central Luminance (L):

Central Luminance must be measured at the central point of the LCD module and at the viewing angle of the θx=θy=0° (Note 4) when all the input terminals of LCD panel are electrically opened.

Note3: Definition of Contrast Ratio (CR):

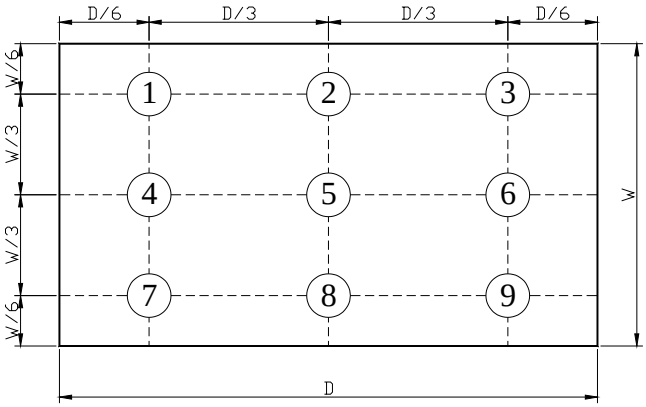
$$CR = \frac{\text{Luminance with all pixels in white state}}{\text{Luminance with all pixels in Black state}}$$

Note 4: Definition of Viewing Angle(CR≥10):



Note 5: Definition of Brightness Uniformity (B-uni):

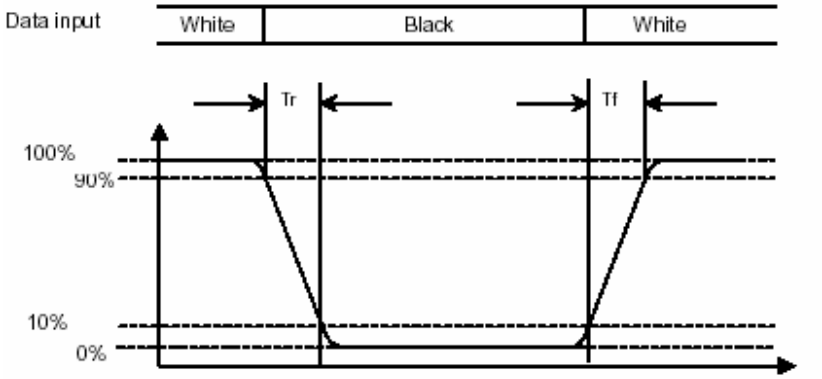
Luminance Measuring Points



$$\text{B-uni} = \frac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9points}}$$

Note6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (Tr)” and the “Falling Time (Tf)” respectively. Tr and Tf are defined as following figure.

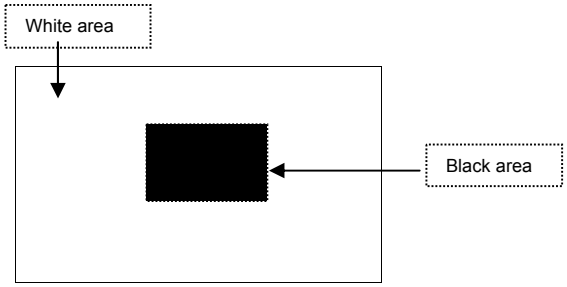


Note 7: Measured at the center area of the panel when all the input terminals of LCD are electrically opened.

Note 8: Definition of Image sticking (tis):

Continuously display the test pattern shown in the figure below for 2 hours. Then display a completely white screen. The previous image shall not persist more than 2 sec at 25 °C

Image sticking pattern



8. PIN CONNECTIONS

8.1 TFT LCD Panel Driving Section

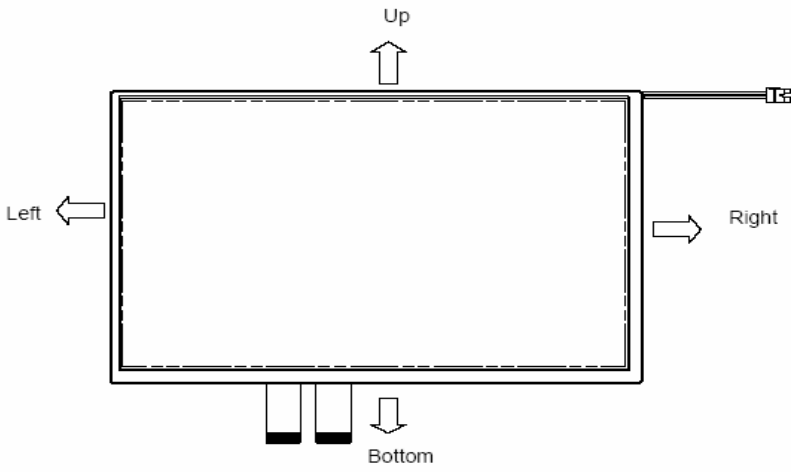
Pin No.	Symbol	I/O	Function	Remark
1	POL	I	Polarity selection	
2	STVD	I/O	Vertical start pulse input when U/D= H	Note 1
3	OEV	I	Output enable	
4	CKV	I	Vertical clock	
5	STVU	I/O	Vertical start pulse input when U/D= L	Note 1
6	GND	P	Power ground	
7	EDGSL	I	Select rising edge or rising/falling edge	
8	VCC	P	Power supply for digital circuit	
9	V9	I	Gamma voltage level 9	
10	VGL	P	Gate OFF voltage	
11	V2	I	Gamma voltage level 2	
12	VGH	P	Gate ON voltage	
13	V6	I	Gamma voltage level 6	
14	U/D	I	Up/down selection	Note 1,2
15	VCOM	I	Common voltage	
16	GND	P	Power ground	
17	AVDD	P	Power supply for analog circuit	
18	V14	I	Gamma voltage level 14	
19	V11	I	Gamma voltage level 11	
20	V8	I	Gamma voltage level 8	
21	V5	I	Gamma voltage level 5	
22	V3	I	Gamma voltage level 3	
23	GND	P	Power ground	
24	R5	I	Red data(MSB)	
25	R4	I	Red data	
26	R3	I	Red data	
27	R2	I	Red data	
28	R1	I	Red data	
29	R0	I	Red data(LSB)	
30	GND	P	Power ground	
31	GND	P	Power ground	
32	G5	I	Green data(MSB)	
33	G4	I	Green data	
34	G3	I	Green data	
35	G2	I	Green data	
36	G1	I	Green data	
37	G0	I	Green data(LSB)	

Pin No.	Symbol	I/O	Function	Remark
38	STHL	I/O	Horizontal start pulse input when R/L = H	Note 1
39	REV	P	Control signal are inverted or not	
40	GND	I	Power ground	
41	DCLK	I	Sample clock	
42	DVDD	P	Voltage for digital circuit	
43	STHR	I/O	Horizontal start pulse input when R/L = L	Note 1
44	LD	I	Latches the polarity of outputs switches the and new data to outputs	
45	B5	I	Blue data (MSB)	
46	B4	I	Blue data	
47	B3	I	Blue data	
48	B2	I	Blue data	
49	B1	I	Blue data	
50	B0	I	Blue data (LSB)	
51	R/L	I	Right/ left selection	Note 1,2
52	V1	I	Gamma voltage level 1	
53	V4	I	Gamma voltage level 4	
54	V7	I	Gamma voltage level 7	
55	V10	I	Gamma voltage level 10	
56	V12	I	Gamma voltage level 12	
57	V13	I	Gamma voltage level 13	
58	AVDD	P	Voltage for analog circuit	
59	GND	P	Power ground	
60	VCOM	I	Common voltage	

I: input, O: output, P: Power
Note 1: Selection of scanning mode

Setting of scan control input		IN/OUT state for start pulse				Scanning direction
U/D	R/L	STVD	STVU	STHR	STHL	
GND	VCC	O	I	O	I	Up to down, left to right
VCC	GND	I	O	I	O	Down to up, right to left
GND	GND	O	I	I	O	Up to down, right to left
VCC	VCC	I	O	O	I	Down to up, left to right

Note 2: Definition of scanning direction.
Refer to the figure as below:

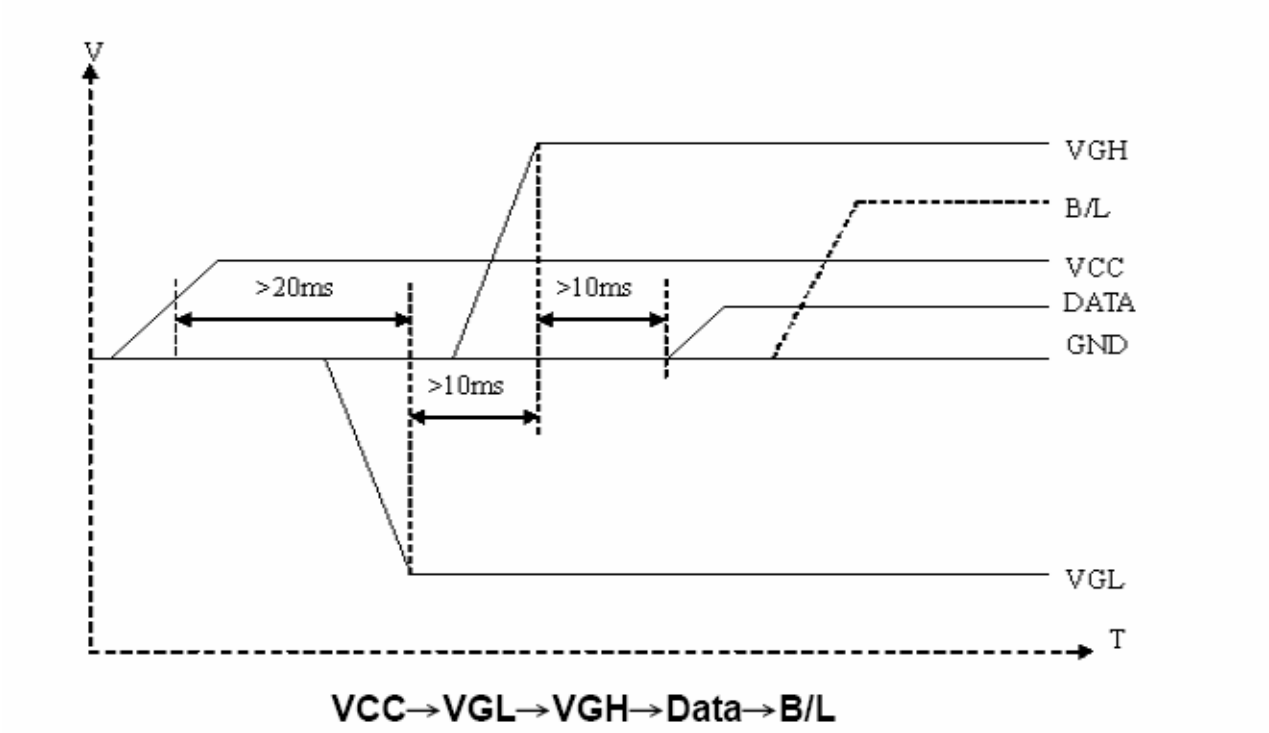


8.2. Backlight Unit Section

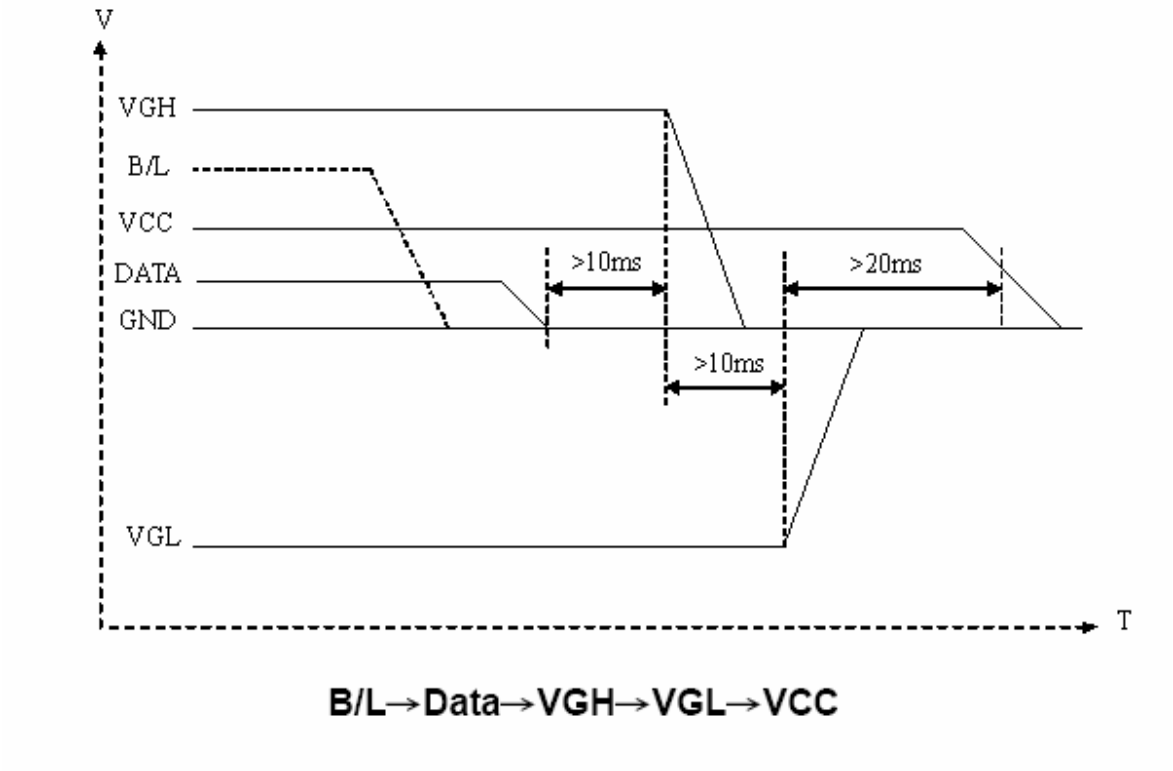
Pin No.	Symbol	Function	Remark
1	LED A	Power supply for backlight unit.	Pink
2	LED K	Ground for backlight unit.	White

8.3 Power Sequence

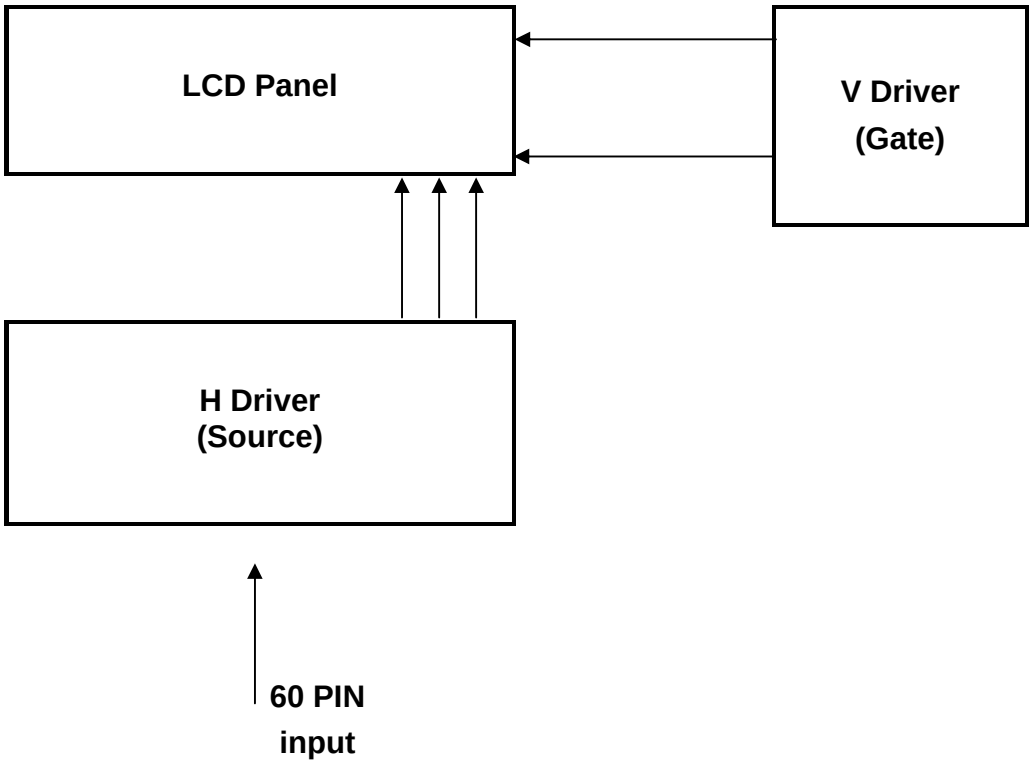
8.3.1. Power on:



8.3.2. Power off:



9. BLOCK DIAGRAM



10. TOUCH PANEL CHARACTERISTICS

1.Input Method and Activation Force

Input Method	Operation Force
1.6mm dia. Delrin stylus	80gf Max.
16mm dia Silicon “finger”	80gf Max.

2.Typical Optical Characteristics

ITEM	Parameter
Visible Light Transmission	82% Min.
Haze	5% TYP.

3. Electrical Specification

ITEM		Parameter
Operating Voltage		DC 7V Max.
Circuit close resistance	X	250~1200Ω
	Y	100~600Ω
Circuit open resistance		≥25MΩ at 25V DC
Contact bounce		<10ms
Linear Test		<1.5%

4.Linearity

ITEM		Parameter
Linear Test Specification Direction	X	≤1.5%
	Y	≤1.5%

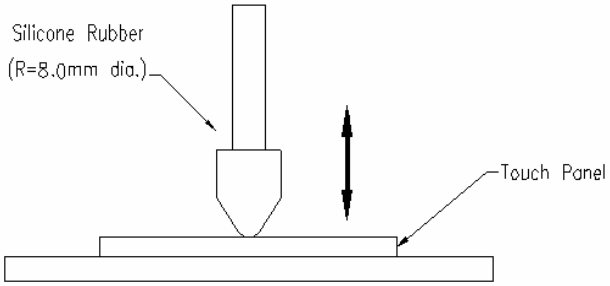
5.Specification

ITEM	Parameter
Operating Temperature	-5°C~+60°C
Storage Temperature	-20°C~+70°C

6.Durability test:

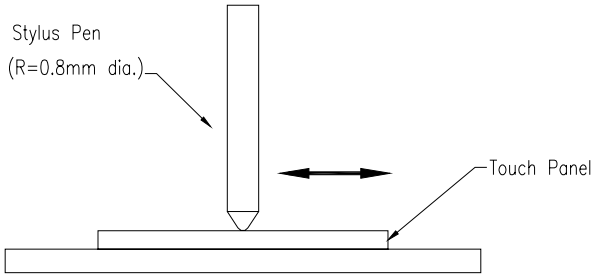
6.1 Touch panel is hit 1 millions times with a silicone rubber of R8 finger, hitting rate is by 200g at 2 times per second. The measurement must satisfy the following:

- Circuit close resistance: x 250~1200Ω ; y 100~600Ω
- Circuit open resistance: ≥25MΩ at 25V DC
- Contact bounce: <10ms
- Linearity test: ≤1.5%



6.2 Stylus writing
Touch panel is drawn by R0.8 Darling stylus pen, at 200g forces, repeat one inch by 100k times. The measurement must satisfy the following:

- Circuit close resistance: x 250~1200Ω ; y 100~600Ω
- Circuit open resistance: ≥25MΩ at 25V DC
- Contact bounce: <10ms
- Linearity test: ≤1.5%



11. QUALITY ASSURANCE

11.1 Test Condition

11.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C
Humidity : 65 ± 5%

11.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

11.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

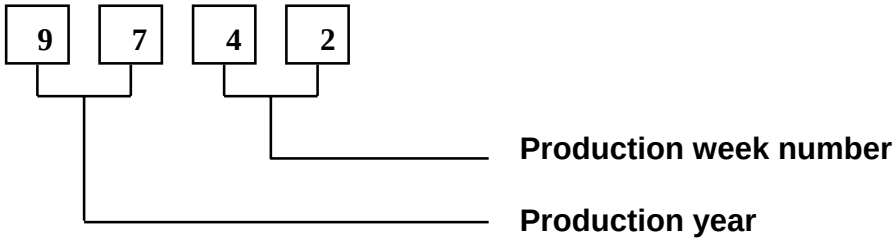
11.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

11.1.5 Test Method

Reliability Test Item & Level		Test Level
No.	Test Item	
1	High Temperature Storage Test	T=70℃,240hrs
2	Low Temperature Storage Test	T=-20℃,240hrs
3	High Temperature Operation Test	T=60℃,240hrs
4	Low Temperature Operation Test	T=-5℃,240hrs
5	High Temperature and High Humidity Operation Test	T=38℃,90%RH,240hrs
6	Thermal Cycling Test (No operation)	-5℃ → +25℃ → +60℃,50 Cycles 30 min 5 min 30 min
7	Vibration Test (No operation)	Frequency：10 ~ 57 Hz Amplitude：1.0 mm 58 ~ 500 Hz, 1G Sweep Time：11min Test Period：3hrs (1hrs for each Direction of X,Y,Z)
8	Shock Test (No operation)	80G, 6ms Direction：± X,± Y,± Z Cycle：1 times

12. LOT NUMBERING SYSTEM



13. LCM NUMBERING SYSTEM

FG 100240 D S S W A G T1

VERSION :T1

RoHS

View direction & Temp. Range

A – Bottom view 6H & Normal temp.

B – Bottom view 6H & Wide temp.

C–Top View & Normal temp

D–Top View & Wide temp.

J–Bottom view 6H & Super Wide temp.

Backlight Color

W –White Y – Yellow Green

G - green

Backlight

C–CCFL B/L

S-LED B/L

LCD Polarize type

N–Negative S – Super wide view

M–transmissive F– transflective

LCD type

A –TFT analog

D –TFT digital

Series code

100240–, 10.2 inch

Model type

FG–Standard TFT Module

FX–Custom TFT Module

14. PRECAUTION IN USE LCM

1. LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handing,

(1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel off or bubble.

(2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzin.

(3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.

(4). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.

(5). Do not drive LCD with DC voltage.

2. Liquid Crystal Display Modules

2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

(1). Do not tamper in any way with the tabs on the metal frame.

(2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.

(3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).

(4). When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting . Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

(5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

2.2. Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

(1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.

(2). The modules should be kept in antistatic bags or other containers resistant to static for storage.

(3). Only properly grounded soldering irons should be used.

(4). If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.

(5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.

(6). Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

2.3 Soldering

(1). Solder only to the I/O terminals.

(2). Use only soldering irons with proper grounding and no leakage.

(3). Soldering temperature : 280°C ± 10°C

(4). Soldering time: 3 to 4 sec.

(5). Use eutectic solder with resin flux fill.

(6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed after wards.

2.4 Operation

(1). Driving voltage should be kept within specified range; excess voltage shortens display life.

(2). Response time increases with decrease in temperature.

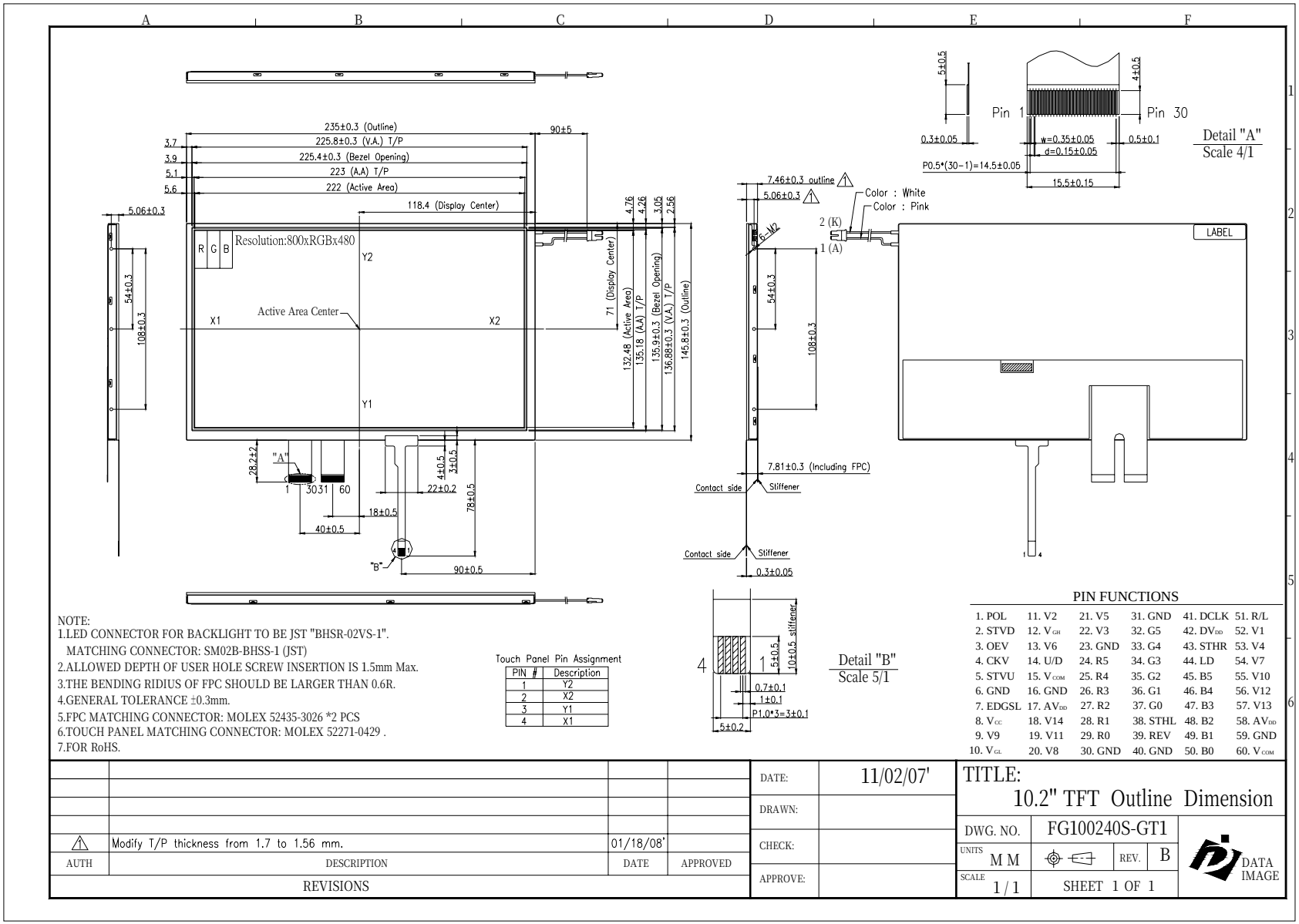
(3). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".

(4). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

2.5 Storage

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

15. OUTLINE DRAWING



NOTE:
1.LED CONNECTOR FOR BACKLIGHT TO BE JST "BHSR-02VS-1".
MATCHING CONNECTOR: SM02B-BHSS-1 (JST)
2.ALLOWED DEPTH OF USER HOLE SCREW INSERTION IS 1.5mm Max.
3.THE BENDING RIDIUS OF FPC SHOULD BE LARGER THAN 0.6R.
4.GENERAL TOLERANCE ±0.3mm.
5.FPC MATCHING CONNECTOR: MOLEX 52435-3026 *2 PCS
6.TOUCH PANEL MATCHING CONNECTOR: MOLEX 52271-0429 .
7.FOR RoHS.

Touch Panel Pin Assignment

PIN #	Description
1	Y2
2	X2
3	Y1
4	X1

PIN FUNCTIONS

1. POL	11. V2	21. V5	31. GND	41. DCLK	51. R/L
2. STVD	12. V_{GH}	22. V3	32. G5	42. DV_{DD}	52. V1
3. OEV	13. V6	23. GND	33. G4	43. STHR	53. V4
4. CKV	14. U/D	24. R5	34. G3	44. LD	54. V7
5. STVU	15. V_{COM}	25. R4	35. G2	45. B5	55. V10
6. GND	16. GND	26. R3	36. G1	46. B4	56. V12
7. EDGSL	17. AV_{DD}	27. R2	37. G0	47. B3	57. V13
8. V_{CC}	18. V14	28. R1	38. STHL	48. B2	58. AV_{DD}
9. V9	19. V11	29. R0	39. REV	49. B1	59. GND
10. V_{GL}	20. V8	30. GND	40. GND	50. B0	60. V_{COM}

⚠	Modify T/P thickness from 1.7 to 1.56 mm.	01/18/08'	
AUTH	DESCRIPTION	DATE	APPROVED
REVISIONS			

DATE:	11/02/07'
DRAWN:	
CHECK:	
APPROVE:	

TITLE: 10.2" TFT Outline Dimension

DWG. NO.	FG100240S-GT1		
UNITS M M		REV.	B
SCALE 1/1	SHEET 1 OF 1		

DATA IMAGE