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TFT | CHARACTER | UWVD | FSC | SEGMENT | CUSTOM | REPLACEMENT

TFT Display Module

Part Number

E43RG54880LWAM400-R

Overview:

- 4.3-inch TFT: (62.66x105.095mm)
- 480(RGB)x800 pixels
- 3SPI+16/18/24-bit RGB Interface
- Wide Tempe
- White LED back-light

- Transmissive/ Normally Black
- Resistive Touch Panel
- 400 NITS
- Controller: ILI9806E
- RoHS Compliant

Description

This is a color active matrix TFT (Thin Film Transistor) LCD (Liquid Crystal Display) that uses amorphous silicon TFT as a switching device. This model is composed of a transmissive type TFT-LCD Panel, driver circuit, resistive touch panel and a backlight unit. The resolution of the 4.3" TFT-LCD contains 480x800 pixels and can display up to 65K/262K/16.7M colors.

TFT Features

Low Input Voltage: 3.3V (TYP)
Display Colors: 65K/262K/16.7M
TFT Interfaces: 3SPI+16/18/24-bit RGB

General Information Items	Specification Main Panel	Unit	Note
TFT Display area (AA)	56.16 (H) x 93.60 (V) (4.3 inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	65K/262K/16.7M	colors	-
Number of pixels	480(RGB)x800	dots	-
TFT Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.117 (H) x 0.117 (V)	mm	-
Viewing angle	ALL	o'clock	-
TFT Controller IC	ILI9806E	-	-
Display mode	Transmissive/ Normally Black	-	-
Operating temperature	-10～+60	℃	-
Storage temperature	-30～+80	℃	-

Mechanical Information

Item		Min	Typ.	Max	Unit	Note
Module size	Height (H)		62.66		mm	-
	Vertical (V)		105.95		mm	-
	Depth (D)		3.85		mm	-
Weight			TBD		g	-

1. Block Diagram

LEDA
LEDK

Backlight

Gate

480(RGB)*800 Panel

Gate

Source

Driver

FPC

2. Outline Dimensions

Dimensions (left view):
- 62.66±0.2 BL
- 62.16±0.1 TP OD
- 57.16 TP AA
- 56.16 LCD AA
- 0.25, 2.75, 3.25
- 0.25, 2.75, 3.25
- 105.95±0.2 BL
- 105.15±0.1 TP OD
- 94.6 TP AA
- 93.6 LCD AA
- 4.3"TFT 480*RGB*800 IPS
- YU, YD, XL, XR
- R G B
- 20.7±0.2
- 58.6±0.3
- 3.5, 50, 1
- W=0.3
- 0.5, P0.5*49=24.5±0.05, R0.3
- 25.5±0.1
- 61.06±0.2

Front/Back view:
- 3.85±0.2
- 4-0.8
- 4-0.8
- FRONT, BACK
- 0.13±0.03 (FPC)
- 0.3±0.03
- CONTACT SIDE, PI ??

Middle view:
- 0.5, 61.66±0.1, 0.51
- 4-φ0.8
- 105.01±0.1
- CONPONENT AREA
- Single
- 5, 3.5

Right view:
- 19.08
- 1, 50
- 56.8±0.5
- 1.0MAX

Pin Name Table

NO.	Pin Name
1	LEDK
2	LEDA
3	NC
4	GND
5	GND
6	VCI
7	IOVCC
8	NC
9	NC
10	NC
11	NC
12	RESET
13	DB23(R7)
14	DB22(R6)
15	DB21(R5)
16	DB20(R4)
17	DB19(R3)
18	DB18(R2)
19	DB17(R1)
20	DB16(R0)
21	DB15(G7)
22	DB14(G6)
23	DB13(G5)
24	DB12(G4)
25	DB11(G3)
26	DB10(G2)
27	DB9(G1)
28	DB8(G0)
29	DB7(B7)
30	DB6(B6)
31	DB5(B5)
32	DB4(B4)
33	DB3(B3)
34	DB2(B2)
35	DB1(B1)
36	DB0(B0)
37	NC
38	NC
39	SCL
40	CS
41	SDI
42	SDO
43	VSYNC
44	HSYNC
45	DE
46	PCLK
47	XR
48	YD
49	XL
50	YU

NOTE: Used RGB(DPI) interface

RGB Interface	DB Pin in use
16 Bit(565) RGB interface	DB0-DB4, DB8-DB13, DB16-DB20
18 Bit(666) RGB interface	DB0-DB5, DB8-DB13, DB16-DB21
24 Bit(888) RGB interface	DB0-DB7, DB8-DB15, DB16-DB23

NOTE: If used RGB mode must select serial interface!

NOTES:

1. DISPLAY TYPE: 4.3", TFT-LCD, 65K/262K/16.7M COLORS
2. DISPLAY MODE: NORMALLY BLACK
3. VIEWING DIRECTION: ALL
4. DRIVER IC: ILI9806E (COG)
5. VCI: 3.3V, IOVCC: 1.8-3.3V
6. OPERATING TEMP: -10℃ TO 60℃
   STORAGE TEMP: -20℃ TO 70℃
7. BACK LIGHT: LED WHITE, 8 LED, 18-20mA, 25.6V±0.3V
8. RoHS COMPLIANT.

LEDK —[LED array]— LEDA

LED(B/L) CIRCUIT
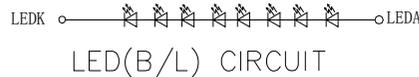
TOLERANCE( )	DRAWING NAME	E43RG54880LWAM400-R
	PARTS NO.	

TOLERANCE UNLESS	X.X±0.3	Drawn	Unit
OTHERWISE SPECIFIED	X.XX±0.2	Checked	mm
Scale 1:1		Approve	Page 1/1

ReV.	Revision contents description	Date

3. Input TFT Terminal Pin Assignment

Recommended TFT Connector: FH12S-50S-0.5SH(55) | Recommended RTP Connector: FH33-4S-1SH(10)

NO.	Symbol	Description	I/O
1	LEDK	Cathode pin of backlight	P
2	LEDA	Anode pin of backlight	P
3	NC	NC	
4	GND	Ground	P
5	GND	Ground	P
6	VCI	Supply voltage (3.3V)	P
7	IOVCC	I/O power supply voltage	P
8-11	NC	NC	
12	RESET	Reset pin. Setting low initializes the LSI. Must be reset after power is supplied.	I
13-36	DB23-DB16 (R7-R0) DB15-DB8 (G7-G0) DB7-DB0 (B7-B0)	Data bus pins. When operating in DPI interface mode, RGB data bus. 24-bit bus: use DB23-DB0 18-bit bus: use DB0-DB5, DB8-DB13, DB16-DB21 16-bit bus: use DB)-DB4, DB8-DB13, DB16-DB20 If not used, connect to GND	I/O
37	NC	NC	
38	NC	NC	
39	SCL	Serial clock input	I
40	CS	Chip select signal Low: chip can be accessed High: chip cannot be accessed	I
41	SDI	Serial data input pin used for SPI interface SDI: Serial data input pin SDA: Serial data input/output bidirectional pin	I
42	SDO	Serial data output pin in Serial interface. If not used, leave open.	O
43	VSYNC	Frame synchronizing signa for RGB interface. If not used connect to GND.	I
44	HSYNC	Line synchronizing signal. Connect to GND or VCC if not used.	I
45	DE	Data enable signal for DPI interface. If not used connect to GND.	I
46	PCLK	Dot clock signal. Connect to GND if not used.	I
47	XR(NC)	Touch panel right glass terminal	A/D
48	YD(NC)	Touch panel bottom film terminal	A/D
49	XL(NC)	Touch panel left glass terminal	A/D
50	YU(NC)	Touch panel top film terminal	A/D

I: Input, O: Output, P: Power

4. LCD Optical Characteristics

4.1 Optical Specifications

Item		Symbol	Condition	Min	Typ.	Max	Unit	Note
Contrast Ratio		CR		700	800	--	%	(2)
Response Time	Rising	TR+TF		--	30	45	ms	(4)
	Falling							
Color Gamut		S		--	70	--	%	(5)
Color Filter Chromaticity	White	W_X	$\theta=0$ Normal viewing angle	0.285	0.325	0.365		(5)(6)
		W_Y		0.326	0.366	0.386		
	Red	R_X		0.596	0.636	0.676		
		R_Y		0.297	0.337	0.377		
	Green	G_X		0.280	0.320	0.360		
		G_Y		0.567	0.607	0.647		
	Blue	B_X		0.107	0.147	0.187		
		B_Y		0.013	0.053	0.093		
Viewing Angle	Hor.	ΘL	$CR \geq 10$	--	80	--	degree	(1)(6)
		ΘR		--	80	--		
	Ver.	ΘT		--	80	--		
		ΘB		--	80	--		
Option View Direction			FREE					(1)

Optical Specification Reference Notes:

(1) Definition of Viewing Angle: The viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3,9 o'clock direction and the vertical or 6,12 o'clock direction with respect to the optical axis which is normal to the LCD surface.
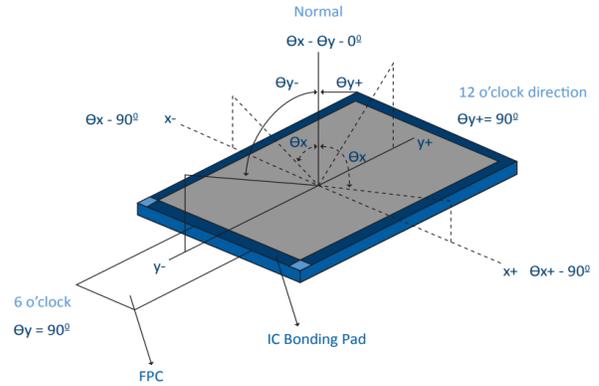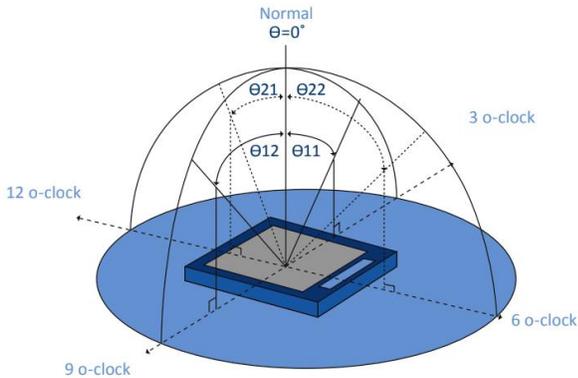
(2) Definition of Contrast Ratio (Cr): measured at the center point of panel. The contrast ratio (Cr) measured on a module, is the ratio between the luminance (Lw) in a full white area (R=G=B=1) and the luminance (Ld) in a dark area (R=G=B=0).

$$Cr = \frac{Lw}{Ld}$$

(3) Definition of transmittance (T%): The transmittance of the panel including the polarizers is measured with electrical driving. The equation for transmittance Tr is:

$$Tr = \frac{It}{Io} \; x \; 100\%$$
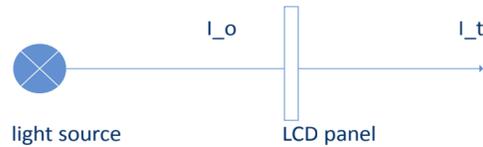
Io = the brightness of the light source.
It = the brightness after panel transmission

(4) Definition of Response Time (Tr, Tf): The rise time 'Tr' is defined as the time for luminance to change from 90% to 10% as a result of a change of the electrical condition. The fall time 'Tf' is defined as the time for luminance to change from 10% to 90% as a result of a change of the electrical condition.
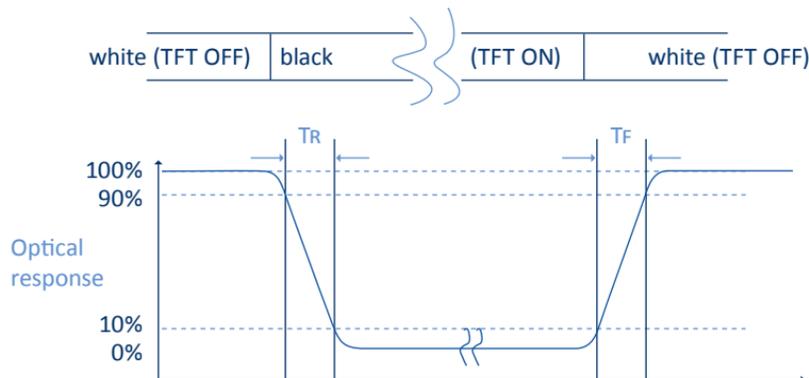
(5) Definition of Color Gamut:

Measuring machine CFT-01. NTSC's Primaries: R(x,y,Y),G(x,y,Y), B(x,y,Y). FPM520 of Westar Display Technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.The color chromaticity shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

1931 CIE Chromaticity Diagram
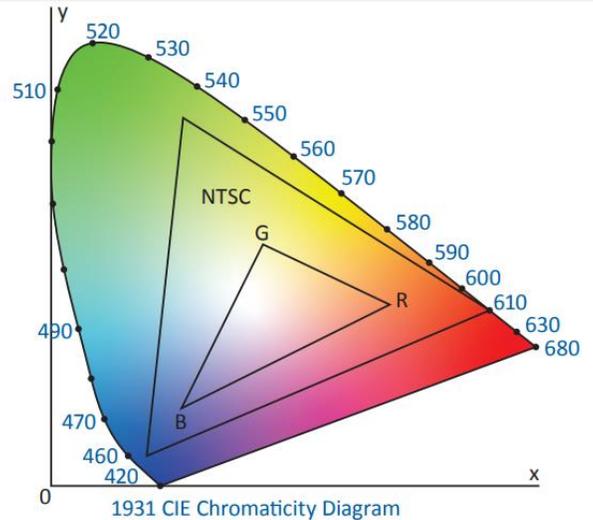
Fig. 1931 CIE chromacity diagram

Color gamut: $S = \dfrac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$

(6) Definition of Optical Measurement Setup:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 20 minutes.

Photometer / Spectograph → Autronics DMS 803

Dark Chamber

measurement point diameter: 3mm

Test Object
Positioning

Horizontal Dimension

Vertical Dimension

X = test point
X = 1 to 5

Photo-detector (BM-5A)

120cm

Center of panel

Field=1°

LCD panel
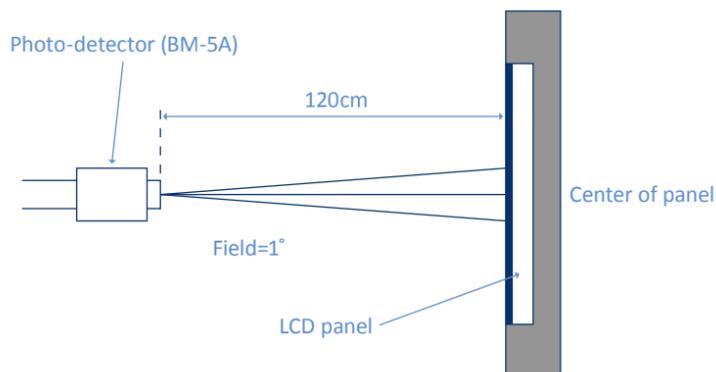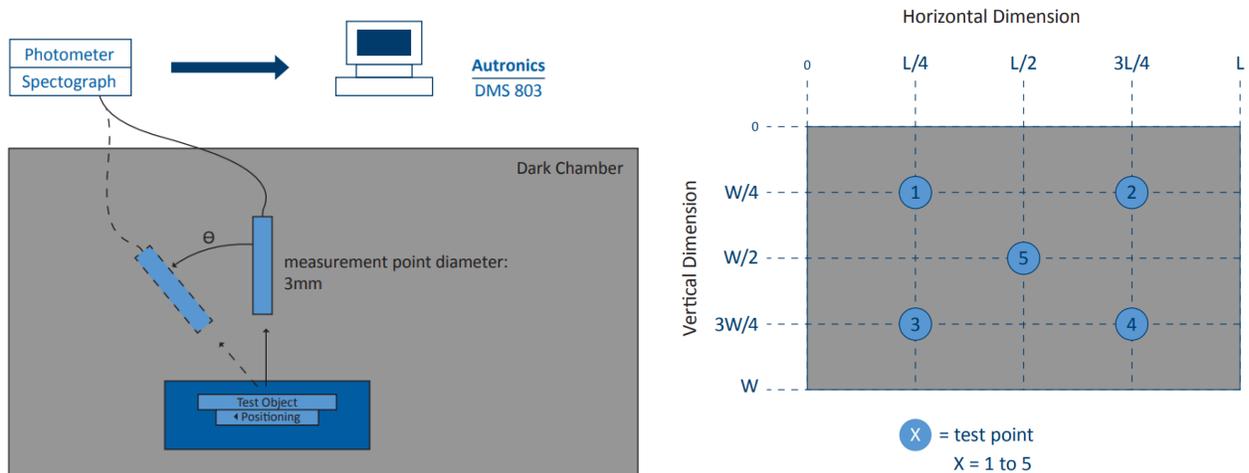
5. TFT Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25 ˚C, VSS=0V)

Characteristics	Symbol	Min	Max	Unit
Digital Supply Voltage	VCI	-0.3	4.6	V
Digital Interface Supply Voltage	IOVCC	-0.3	4.6	V
Operating Temperature	TOP	-10	+60	℃
Storage Temperature	TST	-30	+80	℃

NOTE: If the absolute maximum rating of the above parameters is exceeded, even momentarily, the quality of the product may be degraded. Absolute maximum ratings specify the values which the product may be physically damaged if exceeded. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min	Typ.	Max	Unit	Note
Digital Supply Voltage	VCI	2.5	3.3	3.6	V	
Digital Interface Supply Voltage	IOVCC	1.65	1.8	3.3	V	
Normal Mode Current Consumption	IDD	--	30	--	mA	
Level Input Voltage	VIH	0.7IOVCC	--	IOVCC	V	
Level Input Voltage	VIL	-0.3	--	0.3IOVCC	V	
Level Output Voltage	VOH	0.8IOVCC	--	IOVCC	V	
Level Output Voltage	VOL	GND	--	0.2IOVCC	V	

5.3   LED Backlight Characteristics

The backlight system is edge lighting type with 8 chips LED.

Item	Symbol	Min	Typ.	Max	Unit	Note
Forward Current	I$_F$	15	20	--	mA	
Forward Voltage	V$_F$	--	25.6	--	V	
LCM Luminance	LV	350	400	--	cd/m2	Note 3
LED lifetime	Hr	50000	--	--	hour	Note1 & 2
Uniformity	AVg	80	--	--	%	Note 3

Note 1: LED lifetime (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25 ±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The "LED lifetime" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL = 20mA. The LED lifetime could be decreased if operating IL is larger than 20mA. The constant current driving method is suggested.

Backlight LED Circuit

Note 3: Luminance Uniformity of these 9 points is defined as below:
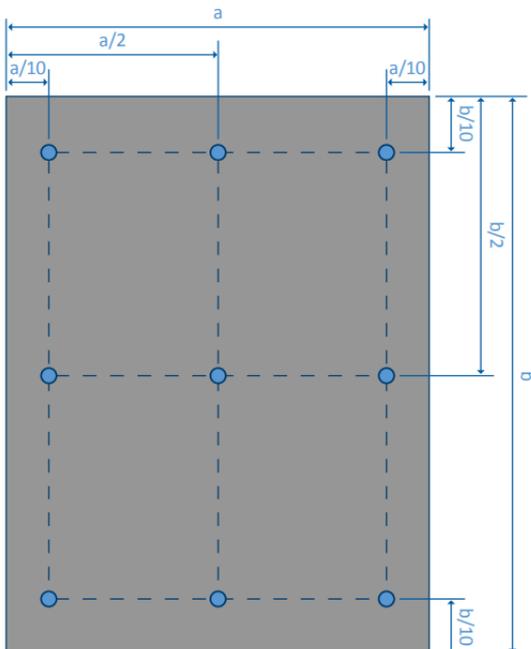
Luminance = $\dfrac{\text{(Total Luminance of 9 points)}}{9}$

Uniformity = $\dfrac{\text{minimum luminance in 9 points(1-9)}}{\text{maximum luminance in 9 points(1-9)}}$

6. TFT AC Characteristics

6.1   Display Serial Interface Timing Characteristics (3-line SPI)
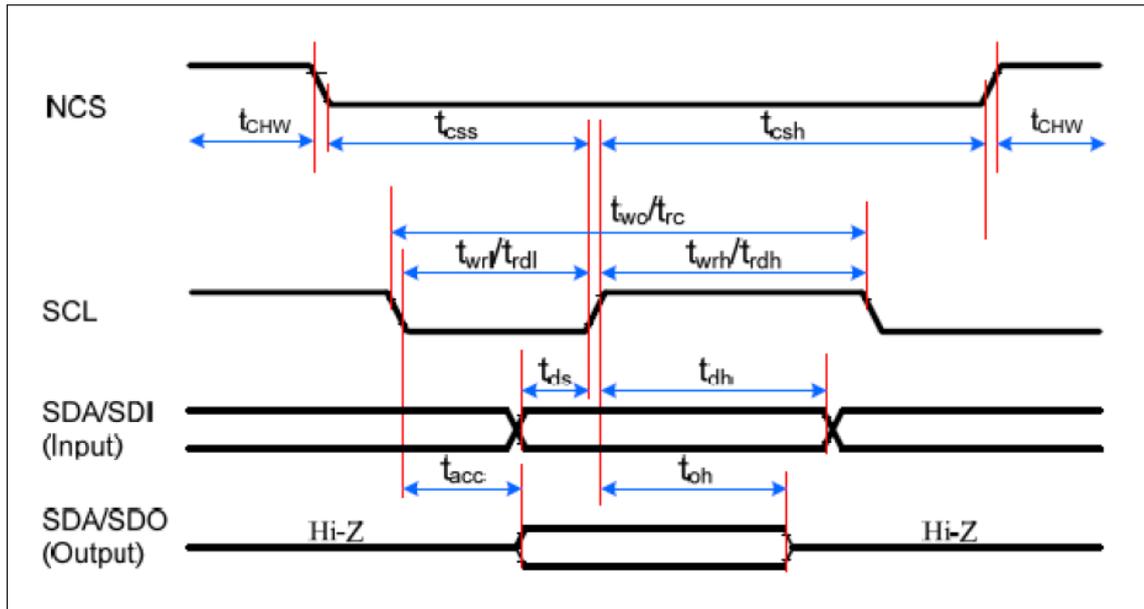
Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	tsc	SCL-CSX	15	-	ns	
	tchw	CSX H pulse width	40	-	ns	
	tcss	Chip select time (Write)	60	-	ns	
	tcsh	Chip select hold time (Read)	65	-	ns	
SCL	twc	Serial clock cycle (Write)	66	-	ns	
	twrh	SCL H pulse width (Write)	15	-	ns	
	twrl	SCL L pulse width (Write)	15	-	ns	
	trc	Serial clock cycle (Read)	150	-	ns	
	trdh	SCL H pulse width (Read)	60	-	ns	
	trdl	SCL L pulse width (Read)	60	-	ns	
SDA/SDI (Input)	tds	Data setup time (Write)	10	-	ns	When read ID data
	tdh	Data hold time (Write)	10	-	ns	
SDA/SDO (Output)	tacc	Access time (Read)	10	100	ns	For max, CL=30pF For mini, CL=8pF
	toh	Output disale time (Read)	15	100	ns	

6.2   Parallel 24/18/16-bit RGB Interface Timing Characteristics
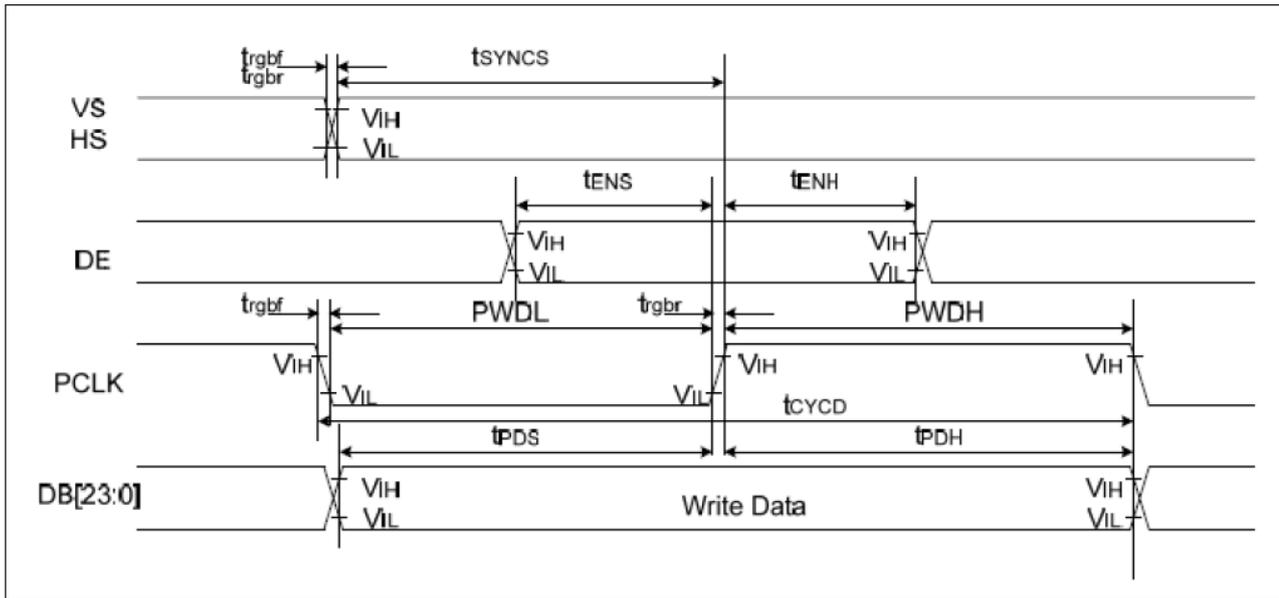
Signal	Symbol	Parameter	Min	Max	Unit	Description
VS/	tSYNCS	VSYNC/HSYNC setup time	5	-	ns	
HS	tSYNCH	VSYNC/HSYNC hold time	5	-	ns	
DE	tENS	ENABLE setup time	5	-	ns	
	tENH	ENABLE hold time	5	-	ns	
DB[23:0]	tPOS	Data setup time	5	-	ns	18/16-bit bus RGB interface mode
	tPDH	Data hold time	5	-	ns	
PCLK	PWDH	DOTCLK high-level period	13	-	ns	
	PWDL	DOTCLK low-level period	13	-	ns	
	tCYCD	DOTCLK cycle time	28	-	ns	
	trgbr,trgbf	DOTCLK, HSYNC, VSYNC rise/fall time	-	15	ns	

6.3 DPI Interface Timing
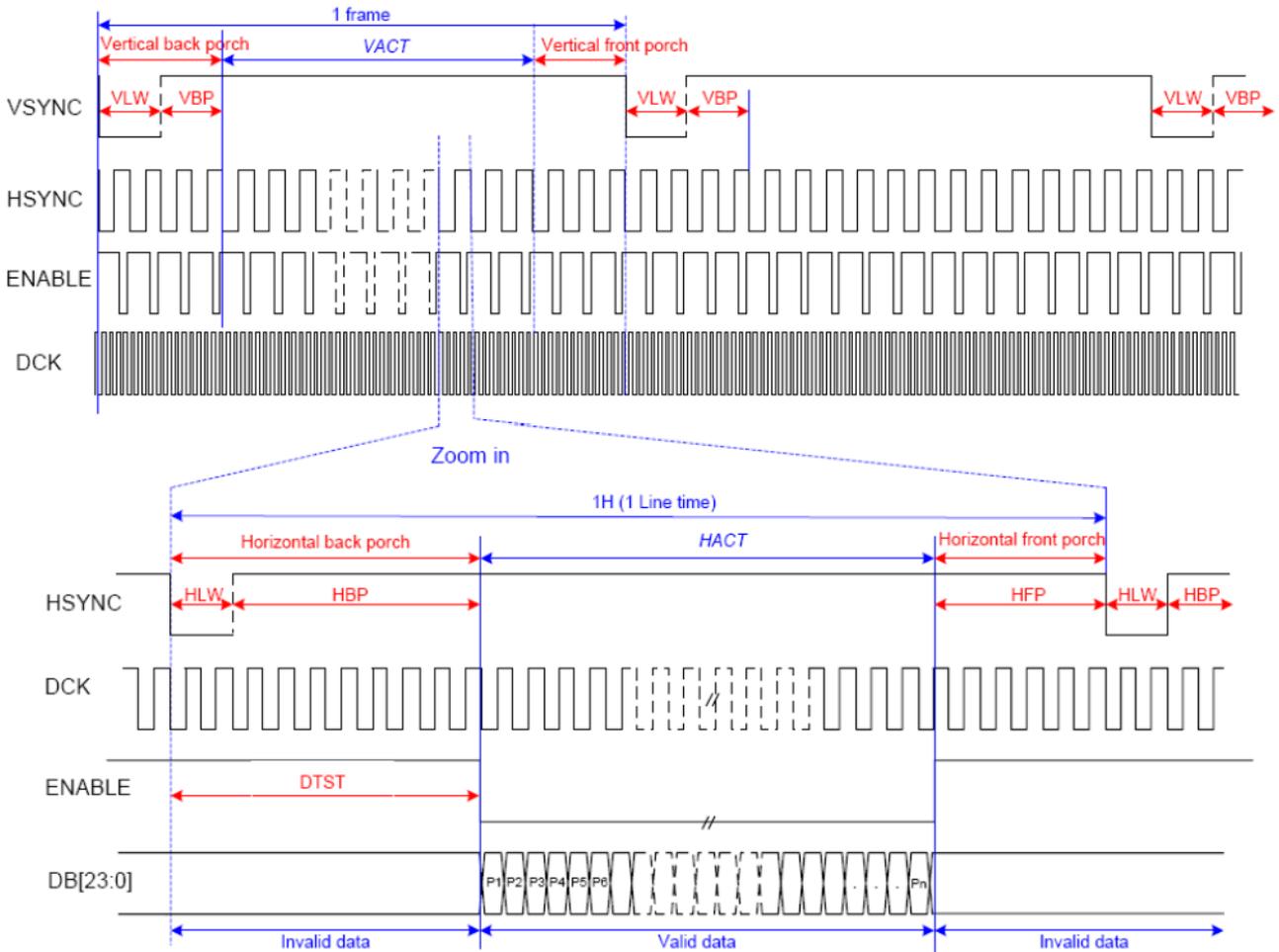
VLW : VSYNC Low pulse Width
HLW : HSYNC Low pulse Width
DTST : Data Transfer Startup Time
Pn : pixel 1, pixel 2···, pixel n.

Parameter	Symbols	Condition	Min	Typ.	Max	Units
Frame Rate	FR		54		66	fps
Horizontal Low Pulse Width	HLW		1		-	DOTCLK
Horizontal Back Porch	HBP		2		126	DOTCLK
Horizontal Address	HACT			480		DOTCLK
Horizontal Front Porch	HFP		2		-	DOTCLK
Vertical Low Pulse Width	VLW		1		126	Line
Vertical Back Porch	VBP		1		126	Line
Vertical Address	VACT				864	Line
Vertical Front Porch	VFP		1		255	Line
Data Clock	DCLK		16.6		41.7	MHz

6.4   Reset Timing
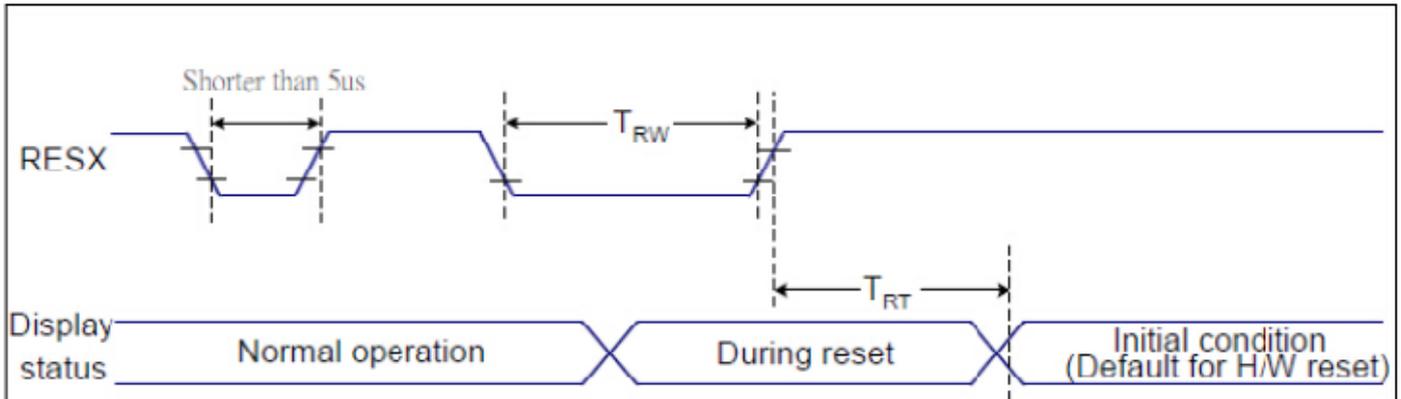
Related Pins	Symbol	Parameter	Min	Max	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1,5)	ms
				120 (Note 1, 6, 7)	ms

Notes:

1. 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 5ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not because irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9 us	Reset starts

3. During the resetting period, the display will be blanked (the display is entering blanking sequence, which maximum time is 120ms, 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.

4. Spike Rejection also applies during a valid reset pulse as shown below:
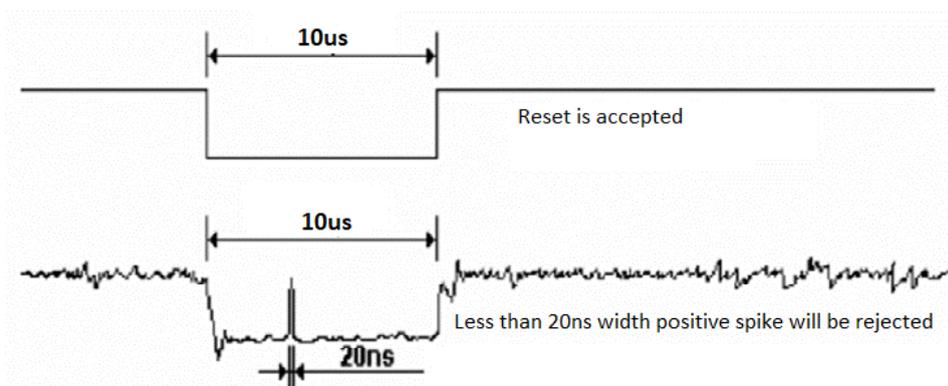
5. When Reset applied during Sleep In Mode.
6. When Reset applied during Sleep Out Mode.
7. It is necessary to wait 5ms after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120ms.

7. TP Feature

7.1 Conditions of Use and Storage

Item	Condition	Note
Temperature range upon operation	Humidity: 20%-90% non-dew, condensation -10℃~60℃	In a simple substance
Temperature range upon storage	Humidity: 20%-90% non-dew, condensation -20℃~70℃	In a simple substance

7.2 Electrical Property

Item	Value	Note
Maximum voltage	DC 5V	
Resistance between terminal	X direction (film side): 200-600 Ω	
	Y direction (glass side): 300-900 Ω	
Insulation resistance	DC 25V, 20MΩ or above	Connect X + ~X and Y+ ~Y, apply 25V DC
Chattering	10ms or below	Between X and Y for perform measurements
Rating	Voltage is 5V DC	
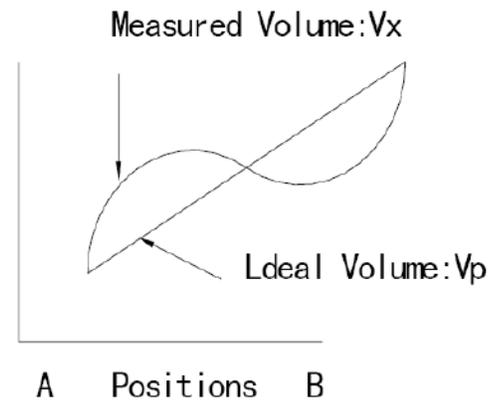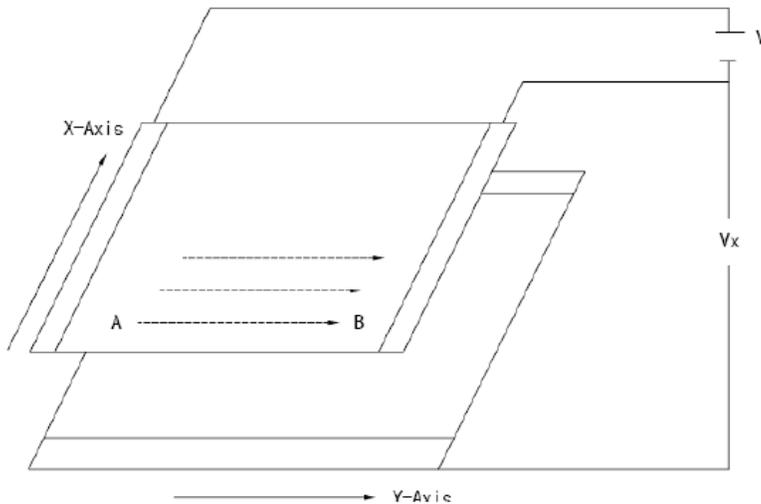
7.3 Mechanical Property

Item	Value		Note
Input method	Used of an exclusive pen or finger		
Load upon operation	Exclusive pen	60-100g or below	Operation and measurement with a pen must be carried out under the following tip conditions: Stylus pen material: POM (ployacetal) Tip: Diameter 3.0mm, SR 0.8 mm
	Finger	60-100g or below	Operation and measurement with a pen must be carried out under the following tip conditions: Stylus pen material: Silicon rubber (Hardness: 30°Hs) Tip: Diameter 12.0mm, SR 12.5 mm
Surface hardness	Pencil hardness: 3H or above		It complies with the way of test method JIS K5400

7.4 Optical Property

Item	Performance	Note
Total light transmittance	80% or above	JIS K7105
Haze	5% or below	JIS K7136
Film specification	Polished type with hard coated surface	

8. Cautions and Handling Precautions

8.1 Handling and Operating the Module

1. When the module is assembled, it should be attached to the system firmly. Do not warp or twist the module during assembly work.
2. Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
3. Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
4. Do not allow drops of water or chemicals to remain on the display surface. If you have the droplets for a long time, staining and discoloration may occur.
5. If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
6. The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
7. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
8. Protect the module from static; it may cause damage to the CMOS ICs.
9. Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
10. Do not disassemble the module.
11. Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
12. Pins of I/F connector shall not be touched directly with bare hands.
13. Do not connect, disconnect the module in the "Power ON" condition.
14. Power supply should always be turned on/off by the item Power On Sequence & Power Off Sequence.

8.2 Storage and Transportation

1. Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%
2. Do not store the TFT-LCD module in direct sunlight.
3. The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
4. It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module. In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
5. This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.